Notebook Series -- Notebooks by Experimenters Other Than Edison
Chemical Experiments -- L. F. Ott Books
Notebook N-20-06-15

This notebook was used by Ludwig F. (Louis) Ott during June 1920-October 1922 for notes on various chemical experiments. There are a few additional entries from November 1924 at the end of the book. Most of the experiments relate to the ingredients used for plating disc records. Some of the entries mention Edison's role in conducting the experiments and his comments in regard to them. Included are tests on the solubility of various solutions and analyses of various plating baths. Also included is a list of chemicals used by Edison in an effort to find one that would remove the Condensite stain from the record molds. Several loose items, including a note from Edison to Ott, have been inserted into the book. A 3-page index appears at the end of the book. The index has been filmed first. The front cover is labeled "Note Book Ludwig F. Ott." The book contains 191 numbered pages, some of which are blank. Pages 110-111 were removed from the book; other pages were removed before pagination.

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Special Soldering Sol

Alcohol	700 cc	1400
Glycerine	200 cc	400
Zinc Chloride	100 g	200

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Goodrich

M. G. STATIONERS,
95 JOHN ST.
AND
PLATT ST.
NEW YORK.

Shellac for Sticking Celluloid to metal, wood, etc.

Shellac	50 grams
Alcohol Denatured	200 cc
Camphor	5 grams

Capacity of Water Still in Chemical Room 100 lbs Steam pressure on coil.

7 1/2 gallons per hour.

Small tank	49 gal
Large Tanks	214 gal
Total	263 gal

Can make 180 gal in 24 hours

6/15/20

1

Exp # 1156 Volatile Solvent for Koppers Varnish -

Formula

8 lbs = 3626.8 grams Koppers Resin
1 gallon = 3785 cc. Toluol

Same proportion reduced for Experiment

Testing out Solvents. Toluol Standard BP. 111.0 C

	Solvent	B.P. 0 C	
1	Benzol	111.0	Good Clear Dries clear quick
2	Benzine	80. max	Partial solvent insol gummy mass
3	Carbon Disulphide	210	Good Clear Dries clear quick
4	" Tetrachloride	76	Good Clear Dries Clear quick
5	Alcohol Denatured	78	Apparently absolutely a non solvent
6	Tetrachlorethane	118	Good Clear Dries Clear quick
7	Gasolene	188 230	Partial solvent insol gummy mass
8	Solvent Naphtha	160	Good Clear Dries Clear quick
9	Acetone	57	Partial solvent insol gummy mass
10	Amyl Acetate	140	Good Clear Dries slower than others
11	Di chlor ethane	87	Good Clear X
12	Acetic Ether		Good a little cloudy (water?)
X	dries slow does not cover glass seems to draw itself together		
13	Ether		Good a little cloudy (water?)

Drying test made by pouring a little on a piece of glass.

Solutions very dilute, therefore they will dry quicker than if standard thickness tests made only for solvents in test tubes.

1 gal Water 8.35 lb Prices Jp-8.

× Benzol $6.30 gallon
Carbon Disulphide $0.11 lb = 1.15 gal 1.55
× Carbon Tetra Chloride 0.14 lb = 1.87 gal 1.6
Tetra Chlor ethane
~~Acetone~~ ~~.22 lb = gal~~
Solvent Naptha 0.30 gallon
Amyl acetate gal 5.00
Dichlor ethane
Toluol $0.33 gallon
Ether lb. 21 gallon 1.124 .71

#1 36.21 grams Koppers Resin
37.85 c.c. Benzol.
Painted on glass drying time 2 minutes
not tacky to a light touch
10 minutes just a little soft.
15 " about hard

#2 36.21 grams Koppers Resin
18.92 cc Benzol
18.92 cc Toluol
3½ minutes not tacky to light touch
15 " about hard

#3 36.21 grams Koppers Resin
37.85 cc Carbon Tetra chloride
Solution heavy does not shread well
9 minutes still a little tacky finger
marks easily made with a light touch

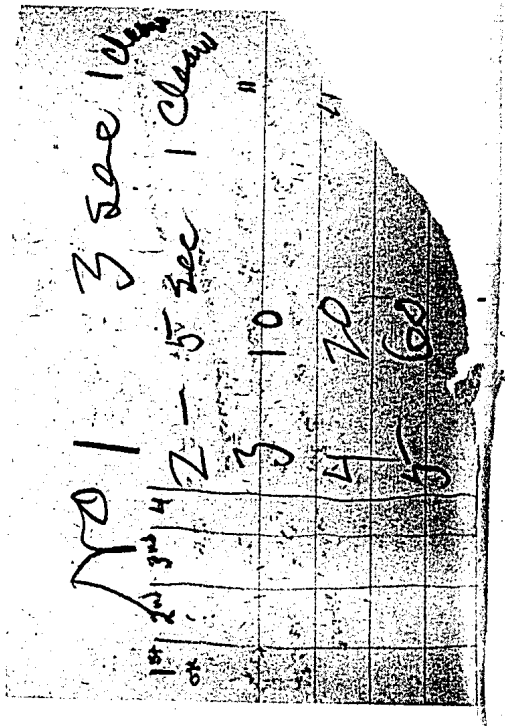
4 1156

#4 36.21 grams Koppers Resin
18.92 cc Carbon Tetra chloride
18.92 cc Toluol.
Spreads easier than #3 with straight Tetra chloride. Thinner
4 minutes just not tacky to a light touch
20 " " hard

#5 36.21 grams Koppers Resin
18.92 cc Carbon Tetra chloride
18.92 cc Benzol.
2 3/4 minutes not tacky to a light touch.
16 minutes just hard

#6 36.21 gr. Koppers Resin
37.85 cc Solvent Naptha

Acetic Acid
Glacial
Water
6000



6/16/20 Morning

Made for T.D.E. to give to Mr Sloan
2000 c.c. Acetic Acid Glacial
6000 cc Distilled Water
Sp.G. @ 30°C = 1,033 = 25% Acetic

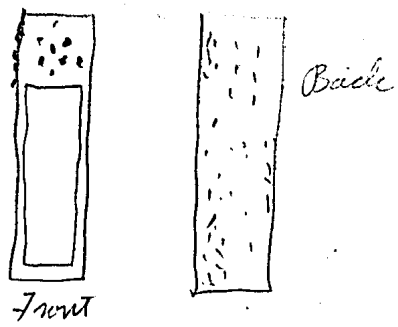
Made up second bottle for Mr Sloan
same as above 6/16/20 at 5.15 P.M.

Delivered June 18/20 to Mr Sloan
1 carboy Acetic Acid Solution

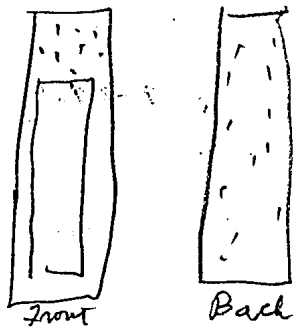
5 X 2 10 liters Glacial Acetic Acid
5 X 6 30 liters Water
Sp.G. @ 1033

#1 and #2 coated on copper with brush one coat let dry 1/2 hour [illegible] then cleaned in cleaning solution rinsed in 8/4 washed and placed 1.2 amperes = .300 amp per □ inch
2 of #1 and 2 of #2.
On 11.30 AM June 17/20.
Off 2.30. 2 hrs 3 hours

Both #1s



Both #2s



#2s not so many spots in back as #1s
One #2 may more spots in front the other #2 less spots

Painted Two Strips with #1 = 36.21 g Roffers Resin 37.85cc Benzol one coat dried 1½ hrs then Painted with Shellac from the Carpenter Shop. one coat dried 1/2 hour put into cleaning solution, washed then in 8/4 then washed then put in Copper Bath C.D. 300 Milli amp per □ inch.

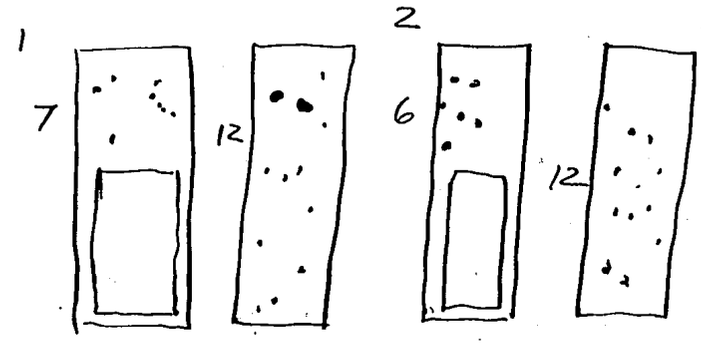
Painted Two Strips with regular Roffers Resin Varnish (Toluol) one coat dried 1½ hours then Painted with Shellac from Carpenter Shop one coat dried 1/2 hour, put in cleaning solution (current) washed then in 8/4 washed then in copper bath C.D. 300 Milli Amp per □".

all four in 11.35

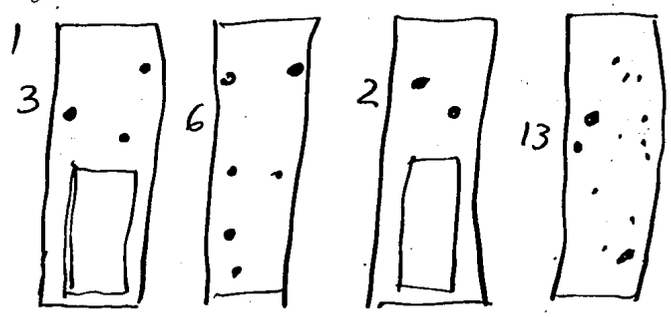
over

at 3.35 4 hours.

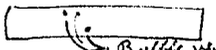
Solved Shellac.



Benzol Shellac

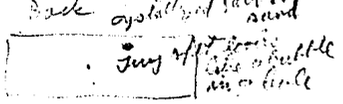


#7 [2] Two Coats of #1 (Kopps in Benzol)
thinned down 1 part #1 with 1 part Benzol
15 minutes drying between each coat
2nd coat does not drag.



Dm cleaning in cleaning Sol. on bottom of plate between 3/4 and mandrel part of bottom of the varnish peeled off.

#8 [3] Three coats of Same as #7 same time drying between each coat
3d coat drags a little
Back middle Shad showing out



#9 [4] 4 Coats of Same as #8 same time drying between each coat
4th coat drags.

Apparently OK

#10 Two coats #1 thinned down with Benzol 1 part #1 1 part Benzol 15 min between coats then 1 coat thinned Shellac in Alcohol.
Quite a few very small Bubbles

#11 Same as #10 except 3 coats of #1 1 coat Shellac in Alcohol
Several Small Bubbles.

#12 Same as #10 except 4 coats #1 1 coat Shellac in Alcohol
Small Bubbles no [illegible] lump
Elongated Bubbles
Small Bubbles throughout
3 hrs dry still a little tacky.

#13 Japan Lacquer 1 part Thinner 1 part 2 coats 15 minutes drying between coats apparently OK

#14 Japan Lacquer 1/2 Thinner 1/2 one Coat dry 15 minutes then 1 coat #1 Benzol & Roffers Resin thinned down 1 part #1 with 1 part Benzol.
Bubbles Face Inner Top Back one in middle near finger marks

#15 One Coat #1 36.21 Roffers Resin 37.85 cc Benzol thinned down 1 part #1 and 1 part Benzol dried 1/4 hour then painted one coat thin Shellac. = Roffers - Shellac

all coats dried 6" above bat plate

after Plating

7-8-9-10 Cleaned in cleaning solution with current washed, S/up Washed put in bath (copper) at 300 m.a. for 4".
On 3.10 off 4.30 = 1 hour 20 min

#7 a lot of small spots all over back
+ 7 count about 50 spots

8 Less Spots than #7 about 30 spots

9 Still Less Spots than #8 about 20 Spots

10 About same as #9 about 20 Spots

11 12 13 14 on 4.45

#11 after 1 hour 7 cu Spots on back
14 " 1 hour 7 full of Small Spots.
12 off 8.30 next morning 17 hrs 20 min
at 1 hour 1 spot quite a few spots all built up large
13 after 1 hour all full of tiny spots and streaks (brush lines filled up with copper

16 Same as 15 except added one coat Roffers Varnish after the Shellac Varnish.
2 Roffers - One Shellac. = Roffers, Shellac, Roffers, Roffers dried 1/4 hour Shellac Dried 1/2 hour Roffers dried 1/2 hour

all coats dried 6" above hot plate
17 Same as 15 except ~~added 1 coat Roffers~~ One coat Roffers then Shellac then Roffers then Shellac 2 Roffers 2 Shellac = Roffers Shellac Roffers Shellac Roffers dried 1/4 hour Shellac 1/2 hour Roffers 1/2 hour Shellac dried 3/4 hours.

all coats dried 6" above hot plate
all 3 - 15 - 16 - 17 on 5.10 PM 24/20

18 (36.21g Koffers Resin 37.85cc Benzol) 1 part diluted with 1 part Benzol one coat dried 5 min, One coat thinned Shellac dried 15 min, One coat Koffers dried 5 min, One coat thinned Shellac dried 30 min
Total time 40 min

19 Same as above except used Koffers (Resin 36.21g Benzol 37.85cc) 10cc diluted with 20cc Benzol. Same number of coats and drying time.

18-19 in Bath 3.15 P.M. 6/25/20

Rack #1

	Solubility of Shellac
1 Benzol ✓	None Solvent
2 Benzene ✓	None Solvent
3 Ether ✓	Partial Solvent (Swelling a little)
4 Acetic Ether	Partial Solvent
5 CS_2 ✓	None solvent
6 CCl_4 ✓	None Solvent
7 Alcohol ✓	Solvent Clearly
8 Amyl Alcohol ✓	Solvent
9 Toluol	None solvent.
10 Solvent Naphtha ✓	None Solvent
11 acetone ✓	Partial Solvent
12 Fusel Oil ✓	Solvent. Some Sol
13 Amyl Acetate	Partial Solvent
Gasoline	Non Solvent

Pack #2

I Rosin

1	Benzol	Solvent (Quick) clear
2	Benzine	Partial Solvent (dissolves very little)
3	Ether	Solvent (Quick) clear
4	Acetic Ether	Solvent (Quick) clear
5	CS_2	Solvent slowly but best clear
6	CCl_4	Solvent (Quick) [illegible]
7	Alcohol	Solvent clear
8	Amyl Alcohol	Solvent clear
9	Toluol	Solvent (Quick) clear
10	Solvent Naphtha	Solvent (quite quick) clear
11	Acetone	Solvent (Quick) clear
12	Fusel Oil	Solvent clear
13	Amyl Acetate	Solvent (quick) clear

Gutta Percha

1	Benzol	Solvent clear (quick)
2	Benzine	Solvent (Partial)
3	Ether	Partial
4	Acetic Ether	Non Solvent
5	CS_2	Solvent very quick clear
6	CCl_4	Solvent clear
7	Alcohol	Non Solvent
8	Amyl Alcohol	
9	Toluol	Solvent clear
10	Solvent Naphtha	Solvent clear
11	Acetone	None.
12	Fusel Oil	Non Solvent
13	Amyl Acetate	Non Solvent

Gum Sandarac

1	Benzol	Partial
2	Benzine	Non
3	Ether	Sol. Clear.
4	Acetic Ac.	Sol Clear
5	CS_2	Swells
6	CCl_4	Partial.
7	[illegible]	Sol clear
8	[illegible]	Sol clear
9	[illegible]	None
10	Sol Hyp.	None
11	Acetone	Sol clear
12	[illegible]	Sol clear.
13	[illegible]	Sol clear

Gum Dammar

1	Benzol	Sol clear
2	Benzine	Partial Solvent
3	Ether	Solvent Clear
4	Acetic E.	Non Solvent
5	CS_2	Sol clear
6	CCl_4	Sol clear
7	Alcohol	Non Solvent
8	Amyl Al.	Partial
9	Toluol	Sol clear
10	Sol Hyp.	Sol clear
11	Acetone	Non Solvent
12	Fusel Oil	Partial
13	Amyl Acet.	Partial

20 10g Koppers Resin in 50cc Benzol 1st coat ✓
2nd coat 10g Sandarac in 50cc alcohol, then ✓
3rd coat Koppers. and 4th coat Sandarac
Sandarac Dries White somewhat powdery. several Bubbles
on 5.50 off 8.30
14 hrs 40 min N.G. full of
Knobs

21 10g Koppers Resin in 50cc Benzol 2nd coat ✓
10g Rosin in 50cc alcohol 1st coat ✓
" " " " " 3rd coat
Koppers 4th coat.
→ Rosin sol in Benzol but Koppers not
therefore did not attempt to put on 4th coat.
Better to make it 1st Koppers in Benzol then Rosin in alcohol
10 minutes between each coat
all came off in cleaning Solution.

22 1st coat Shellac in Alcohol
2nd coat 10g Rosin in 50cc Benzol
coin not review as Rosin is soluble in Benzol
all comes off in cleaning sol

23 ✓ 1st coat 10g Dammar in 50cc Benzol
↓ 2nd coat Shellac in alcohol
↓ 3rd coat Dammar — 3 bubbles.
↓ 4th coat Shellac —
on 5.50 off 8.30
14 hrs 40 min
19 Knobs. 7 air.

24 1st coat Gutta Percha in Benzol 2g in 50cc
↓ 2nd coat Shellac in alcohol
↓ 3rd Gutta
↓ 4th Shellac
N.G. cleaning sol gets in under the
Gutta Percha and peels it off

25 1st coat Gutta Percha 2g in 50cc Benzol
↓ 2nd coat Sandarac in alcohol 10g in 50cc
↓ 3rd coat Gutta 2 bubbles 3 drops
↓ 4th Sandarac
10.40 on

26 ✓ 1st coat Gutta Percha 10g in 50 cc Benzol
✓ 2nd coat 10g Dammar in 50 cc Benzol
✓ 3rd coat Gutta
✓ 4th coat Dammar
Many Bubbles.
on 10.40

27 ✓ 1st coat Gum Sandarac 10g in 50 cc Alcohol
✓ 2nd coat Dammar in Benzol 10g in 50 cc
✓ 3rd coat Sandarac
✓ 4th coat Dammar 4 bubbles
on 10.40

28 ✓ Roffers in Benzol 10g in 50 cc 1st coat
Collodion very thin 2nd "
Roffers 3rd "
Collodion 4th "
M G
Roffers sol in con –

29 Amature Varnish from Fred Ott
2/3 Varnish 1/3 Benzol
on 10.40
Dried 30 minutes peels off
in the clearing Bath

30 One coat White Shellac from Cabinet Dept. Dried 1/2 hour then One coat Rubber Cement from Combination 20 cc + Benzol 20 cc

31 One coat White Shellac from Cabinet Dept dried 1/2 hour One coat Rubber Cement from combination 30 cc + Benzol 10 cc

32 One coat White Shellac from Cabinet Dept Dried 1/2 hour One coat Rubber Cement from Combination (Straight).

33 One coat White Shellac from Cabinet Dept Dried 1/2 hour One coat Rubber Cement (Combination) 20 cc + Benzol 20 cc dried 15 min
2nd coat of Shellac Dried 1/2 hour
2nd coat Rubber Cement

34 One coat White Shellac from Cabinet Dept. dried 1/2 hour One coat Rubber Cement Combination 30 cc Benzol 10 cc dried 15 min
2nd coat White Shellac dried 1/2 hour
2nd coat Rubber Cement

35 One coat White Shellac from Cabinet Dept dried 1/2 hour One coat Rubber Cement Combination Straight dried 15 min
2nd coat White Shellac dried 1/2 hour
2nd coat Rubber Cement

Gum Balata

1 Chloroform Quick Sol
2 CCl_4 Sol Quick
3 Benzine
4 Solvent Naptha
5 Toluol Soluble Quick
6 Benzol Soluble

Pontianak or Jelutong

1 Chloroform Soluble
2 CCl_4 Soluble
3 Benzine Partially milky
4 Solvent Nap. all but a few flakes
5 Toluol all but a few flakes } probably soluble in time
6 Benzol all but a few flakes.

Final Results showed that all Gums Waxes etc. dissolved in volatile solvents give minute pin holes through which the copper is deposited on plating forming blisters when put on with a brush.

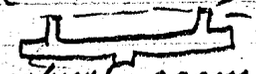
The rubber cement put on with a brush is N.G. but flowed on is O.K. this latter test conducted by Mr Edison Personally.

Experiment to make an abrasive rubber compound for cleaning Mould Surfaces.

Rubber compound made by the new Peachey Process of Cold Vulcanization Chemical Age July 3, 1920 Page 4.

1 volume Stock Rubber Cement from Combination Rubber Co Saturated with SO_2 1 volume saturated with H_2S.

Mixed the weighed amount of abrasive in a mortar with a little of the SO_2 Saturated Rubber Solution poured in more until all added then added an equal portion of H_2S Sat. Rubber Solution mixed well poured a little on a glass plate the rest in one of the fruit jar tops turned top side down

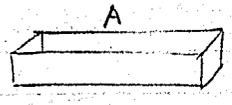


and let it dry natural room temp.

All Same amount of rubber Sol
25 cc Saturated with SO_2
25 cc " " " H_2S

#1 Rubber Solutions + 1g Zn O
2 " " + 3/4g " " "
3 " " + 1 1/2 " " " "
4 " " + 2g " " "
5 " " + 1g Blanc Fix
6 " " + 3/4 " "
7 " " + 1 1/2 " "
8 " " + 4 " "
9 " " + 1 g Red Lead " "
10 " " + 2
11 " " + 3 " "
12 " " + 4 " "

13 Rubber Solutions 2g Vienna Zinc
14 " " 4 " "
15 " " 6 " "
16 " " 2g Mg O
17 " " 4g Mg O
18 " " + 2g Double Washed Flour Emery
19 " " 4 " " " "
20 " " 6 " " " "

Made 2 moulds one 

$1\frac{1}{2} \times 1\frac{1}{2} \times 6$

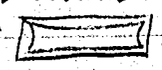
one

bolted together in sections

all nickel plated bolted one highly polished

125 cc Stock rubber solution saturated SO_2 mixed gradually in a mortar with 30 g Double Floated Flour Emery then added 125 cc Stock Rubber Solution saturated with H_2S stirred well for 1/2 min then poured at 1240 P.M. Saturday July 24. took out of moulds Sunday July 25th 945 A.M.

Remarks

Stuck a little in corners and bottom in mould A free on sides and ends  nearly to bottom.

Mould B shape kept all the way to within 1" from top came away from walls o.k.

except on bottom where the paper gasket caused it to stick.

Smelled strongly of SO_2

Experiment to remove the Stain from Record Moulds.

Divided a disc into 16 Sections and poured a few drops of Various chemicals on each section. No Results Recorded Mr. Edison made them personally.

Plate #1

1 Epichlorhydrine

2 Bromoform

3 Lactic Acid

4 Trichlorethylene

5 Hydrazine Sulphate in warm water. Cleans Fair

6 Chloral Hydrate in water

7 Hydroquinone in water

8 Hydroquinone in Alcohol

9 Acid Chromic Cleans. Good

10 Acid Tartaric Water

11 Ortho cresol concentrated

12 Aniline Hydrochloride in water
Cleans Fair

13 Glucose 50%

14 Amyl Acetate

15 Pyridine

16 Formaldehyde 40%?

17 P amido phenol in water

18 Acetanilid in water

19 P phenylenediamine in water

20 Hydroxylamine Sulphate in water

21 Hydroxylamine Hydrochloride in water

22 Aniline Oxalate in water

23 Aniline Sulphate in water

24 Aniline Nitrate in water

25 C/4 in water

26 HCl of 6/4 in water

27 Dinitrobenzol in alcohol

28 Dichlorbenzol liquified

29 out

30 Benzyl alcohol
31 -32 out.

Plate #3
All plate 3 N.G.

33 Dimethylaniline in alcohol

34 Dibromoanthracene

35 Carbazol

36 Ortho nitrophenol

37 Trichlorphenol

38 Azobenzol

39 mononitronaphthalene

40 Para nitro Toluol

41 Antipyrine

42 Phenacetin

43 Thiocarbamide

44 Resorcine

45 Orthotolidine

46 Benzidine

47 Acid Tannic in water

48 Acetyl chloride

Plate 4

49 Acid Hydrobromic

50 Acid Pyrogallic in Water

51 Acid Formic

52 Acid Perchloric

53 Acid Phosphoric Glacial in water

54 Acid Pyrogallic + NaOH

55 Dichlorhydrine

56 Acetylene Tetrachloride

57 Acid Acetic

58 Ethylene Chloride

59 Phenetol

60 Trichlor acetic Acid

61 Picric acid

62 Acid Oleic

63 Bromine Water

64 Iodine Solution $I + KI$

65 $KMnO_4$

66 $NaCN$

67 K Ferrocyanide

68 K Ferricyanide

69 K Dichromate

70 K Perchlorate

71 Ammonia

72 NH_4Cl

73 Ammon Nitrate

74 Ammon Oxalate

75 Sodium Sulphite

76 Sodium Hyposulphite

77 Sodium Peroxide

78 Barium Peroxide

79 Ammon. persulphate

80 Na Acetate

1158 Solvents for Rubber Aug. 17/20
4 Pieces Bolivian Up River Para 1/8" square
in the following solvents
on. 11.00 AM

1 Benzine (Petroleum)
23 hours does not dissolve but swells up.

Jny
2 Solvent Naphtha
23 hrs all dissolved except a few flocks.
30 min

Jny 3 Carbon Tetra Chloride
2 PM 1/4 dissolved 1/2 dissolved 4 PM
23 hrs about 3/4 dissolved (Dries 1 min)
Congeals easily

Jny 4 Toluol
2 PM 1/2 dissolved 3/4 dissolved 4 PM
23 hrs Nearly all dissolved clear
Dried in 5 min

Jny 5 Xylol
2 PM. 1/2 dissolved about 1/2 at 4 PM swollen much more
23 hrs Nearly all dissolved clear 20 min

6 Turpentine
1/4 dissolved 4 PM 24 hrs and still smell turpentine Sticky
23 hrs Nearly all dissolved Clear
7 hrs very good

Jny 7 Chloroform
2 PM Nearly all dissolved a little undissolved 4 PM
23 hrs. Nearly all dissolved Gets cloudy in spots when poured dries very quick

8 Acetone
23 hrs Does not even swell

9 Acetic Ether
23 hrs Does not even swell

10 Fusel Oil
23 hrs Does not even swell

11 Amyl Alcohol
Does not even swell

12 Propylic Alcohol
23 hrs Does not even swell

13 Terpinol
23 hrs Swells only a little

Ny 14 Mono chlor benzol 18 Crystalline Long time to dry
1/2 dissolved 4 PM
23 hrs Dissolved but a few flocks. clear

Ny. 15 Dichlorbenzol 20
23 hrs. a little dissolved 4 PM very clear.
a little cloudy when poured Long time to dry
Crystalline

16 Benzotrichloride 23 (7 mins)
Swells gets cloudy when poured
23 hrs 9/10 dissolved clear 4 hrs and not dry.

X 17 Perchlorethylene 25 30 5 min
Jy 2 PM 1/2 dissolved Practically all dissolved clear 4 PM

Jy 18 Pentachlorethane 28 a little sticky
1/2 dissolved 4 PM 30 min
23 hrs. 9/10 dissolved

Jy 19 Trichlorethylene 30 33 a little sticky
2 PM. 3/4 dissolved 3 min
23 hrs 9/10 dissolved

20 Kerosene
23 hrs Swells a great deal not dissolved

21 Methyl ethyl ketone
23 hrs does not cause swell

Jy 22 Monobrombenzol 32
2 PM particles very small practically dissolved 30 min
23 hrs. Nearly all dissolved clear

23 Butylic alcohol
23 hrs Does not cause swell

24 Carbon Disulfide
2 PM nearly all dissolved
23 hrs 9/10 Dissolved

2, 3, 4, 5, 7, 17, 18, 19, 22,

Made up in large batches dissolving 15 cc grams of Bolivian Ult Rosin in of Solvent.
Started with 400 cc solvent first.

Capacity of Big Water Still

15g Bolivian Para dissolved in 700 cc
Carbon Tetra Chloride.

25" Weight of Bottle	18.6410	4/5 sec 20 cc
47.6085	19.0315	
18.6410	18.6410	
28.9675	.3905 grams rubber in 20 cc (about.)	
weight of 20 cc (about)		

Fred Ills Rubber from Connecticut.

#24 Weight of Bottle	18.7445	14 sec. 20 cc
35.2420	20.2727	
18.7445	18.7445	
16.4975	1.5282	
weight of 20 cc (about)		4 times

Aug 27/20

Experiment to remove bondenite from face of moulds.

Concentrated solutions of the following poured on a board to see if it loosens or dissolves the condenite to be tried afterward on metal.

1 Li OH

2 Lithium Chloride

3 Lithium Nitrate

4 Sodium Sulphite

5 Sodium Sulphite

6 Sodium Hyposulphite

7 Sodium Chromate

8 Sodium Cyanide

Special Sample $NiSO_4$ Plating Sol
6 zinc # Edison Storage Battery.

Sp. G. @ 15° C = 1.1260
Free Acid 1.1 X 40 X .005352 = .2354 g per Liter
Copper = .2 X 10 X .006945 = .01389
Nickel = 9.1 cc X .008828 X 400 = 32.13 g per Liter
= $NiSO_4 7H_2O$ 153.75 grams per Liter.
For Nickel 25 cc to 250 took 25 = 2.5 cc X 400
= Liter.

Sample of Nickel Plating Solution
from Big Bath Reed Sept. 1/20

Free Acid = 6. X 40 X .006558 = 1.57 g per Liter
Copper .5 X 10. X .006945 = .003 g per Liter
25 cc to 250 took 25 = 2.5 cc
.04224 X 31.5 cc Cyanide X 400 = 532.22
grams $NiSO_4 7H_2O$ per Liter
Total =
Insoluble = 9.1580

Sp. G. @ 20° C 1.2780
Free Acid 1.57 grams per Liter
Copper .003 " " "
Ni 111.19 " " "
$NiSO_4 7H_2O$ 532.22 grams per Liter
Iron
Alumina

analysis of Mr Bath Reed from Mr. Edgerton
Left, 2/20 for Copper
1 Liter Contains .027 g Cu.
.4 x 10 x .006405

Factors for Mr Redford:
Factors posted on the bottle of Hypo
Factor for Free Acid = .2468 x cc = grams
free Acid per liter
Factor for Copper .06534 x cc = grams
Cu per liter

Lott — Formula changed to 3 Lead 3 Tin 1 Bismuth

900 Lead grams
900 Lead "
300 Tin "

Make up for Moore 5 lbs 3 3 1

of Solder

3 3.3 Lead
3 3.3 Tin
3 3.3 Bismuth
} Solder

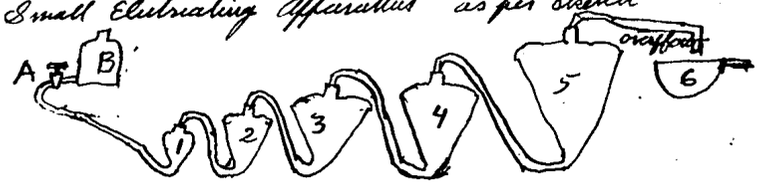
Cast in sticks just same as your Sample E

450 grms
5 lb.
2250 800
3) 2400 grams.
800 grams Lead
800 " Tin
800 " Bismuth

Oct. 4/20

Exp. # 1159 Diamond Recovery and Grading Apparatus #1

#1 Small Elutriating Apparatus as per sketch



6 grams Lead Glass Thru 200 Mesh
Put a little water in #1 then added the Glass gradually shook up well, then opened Cock A full
Took water 5 minutes to come out at the overflow let it run 3 minutes then stopped as the grading was all in Vessels 5 and 6

#2 Repeated the same experiment only that cock A was partially opened had to blow in at neck of bottle B twice to force water thru.
Took water 19 minutes to come out at overflow let run 22 minutes when #1 was clear found sediment in all the vessels.

		Grams
Vessel	#1	0.215
"	2	1.620
"	3	0.650
"	4	0.570
"	5	1.640
Overflow	6	0.540
		5.235

6.0000
5.235
.765 stuck to paper and some went thru the filter paper.

3 Repeated Exp. 2 with glass that had been treated as follows 6 grams. Glass Powder + 2 grams Green Olive Oil + 2 cc Petrolium Benzine. Mixed well then removed oil with 50 cc Acetic Ether let stand then decant, this was repeated 3 times 150 cc in all, then let dry still smelled slightly of oil, so treated twice with 50 cc Benzol then dried, then 10 cc HCl and 2 cc HNO_3 heated on hot plate 1 hour then filtered and washed with water until free of chlorides, dried then washed on filter with 50 cc hot Benzol dried and graded 5.120 g. to grade.
Took water 20 minutes to come out at overflow then let run 20 minutes until #1 was all clear.

		Weight	
Vessel #	1	0.600	
"	2	0.670	
"	3	0.400? –	Lost some from wind
"	4	0.900	
"	5	1.500	
"	6	0.450	
		4.520	

4 Treated 100 grams Glass powder thru 200 mesh, 25cc Alcohol + 75cc Benzene same as #3 except that did not let it dry after 3 treatments with 200 cc. each (600 cc in all) Acetic Ether but poured on 200 cc Benzol, found after standing a sort of jelly like substance floating on top. so made a mixture in a test tube of Benzol & Acetic Ether and let stand, no such result, as it mixes up clear. Poured off the Benzol from the Glass Powder and added another 200cc Benzol and let stand some more of the substance found in on the top of the Benzol. added another 200cc Benzol let stand poured off then filtered and washed on vacuum filter with 100cc Hot Benzol

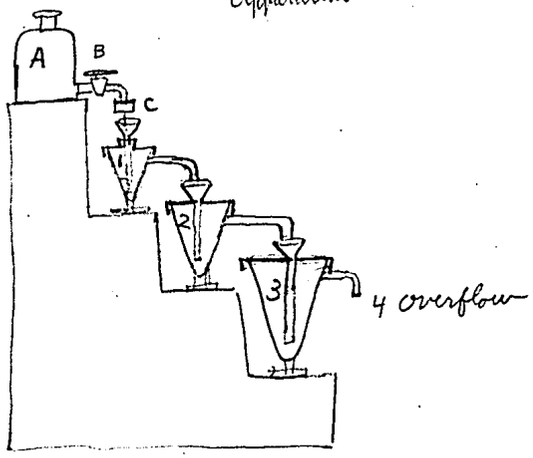
then dried, still smelled a trace of oil, so treated again with 200cc Acetic Ether and let stand, took off 10cc with pipette and let evaporate on watch crystal, quite a large residue, did not smell oily dissolved in water so tested with $KMnO_4$ 1/100 normal for organic matter consumed quite a little Permanganate to a permanent color, also foamed when shaken up in a test tube.

Exp. # 1160.

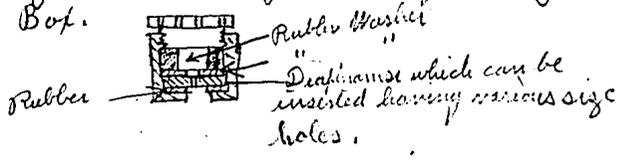
200 grams Lead Glass thru 200 mesh from O. Hart found to be alkali so washed and boiled with water until practically free.

Took 25 g wet it with water in a mortar and worked up into a paste adding more water gradually breaking up the lumps. put this in the elutriating apparatus #1 Vessel and ran with until overflow from #1 was practically clear. which took 30 minutes. using Diaphram with $\frac{40}{1000}$ hole.

Apparatus



The water level in A was kept within 2" at constant level. Water flows thru Cock B and diaphram C. described as follows Made from a Storage Battery Stuffing Box.



Sediment	Vessel # 1	=	17 grams
"	" 2	=	2. "
"	" 3	=	2. "
"	Overflow	=	3.5 "
"	Thru Filter		5
			25 g.

Grading under Microscope

Exp. #1161

Same as 1160 except used a Diaphram with 1/16" hole Time until overflow from #1 vessel was clear 12 minutes $\frac{62}{1000}$

Sediment	#1	vessel	= 11.0 g
"	#2	"	= 3.0
"	#3	"	= 3.5
"	Overflow		= 4.5
"	Thru Filter		= 3.
			25.0

Grading under Microscope

Exp #1162

Same as #1160 except used a Diaphram with $\frac{51}{1000}$ hole Time until overflow from #1 vessel was clear 17 minutes —

Sediment	#1	vessel	= 13.5
"	#2	"	= 3.0
"	#3	"	= 2.5
"	Overflow		= 2.0
"	Thru Filter		= 4.0
			25.0

1163 Same as 1160 except used a diaphram $\frac{3}{32}$ opening. Time until overflow from #1 Vessel was clear - 5 minutes $\frac{93}{1000}$

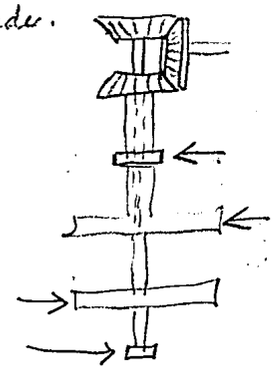
Sediment #1 vessel	=	.5
" 2 "	=	7.5
" 3 "	=	3.5
" Overflow "	=	10.0
Thru Filter	=	

1164 Same as #1160 except used a diaphram $\frac{80}{1000}$ opening Time until overflow #1 was clear 8 minutes.

Sediment #1 vessel	=	11.5 g
" 2 "	=	4.5
" 3 "	=	3.5
" Overflow	=	4.5 240
Thru Filter	=	

1165

Same as 1160 using a $\frac{40}{1000}$ opening in diaphram time 1/2 hour - until overflow from vessel # 1 was clear. except in this case agitated the glass powder 25 g in about 100 cc water for 1/2 hour at 450 R.P.M. in the small double stirrer mixer which I had built made.



then put in vessel # 1 and elutriated

Vessel #	1	=	17.0 grams
"	2	=	2.5 "
"	3	=	2.0
Overflow	4	=	2.0
			23.5

Cement for coating back of Moulds for plating bath =
7 grams ground Celsonite + 100 cc Rubber Cement from Consolidated Rubber Co

1167 Experiment making Graphite more conductive

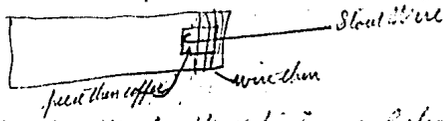
5.5 grams graphite
.55 $AgNO_3$
11.0 cc H_2O

Mixed the above and divided into two nearly equal parts

One portion #1 was reduced in H wet at 520°C temp kept for 1/2 hour. Let cool in H.

2nd portion #2 dried on hot plate reduced in H at 520°C temp kept for 1/2 hour let cool H.

Coated a piece of wax 1"X4" with Regular graphite using a piece of velvet for affixing the graphite using a different piece for #1



Regular Master Mix floating solution.
Rate 100 M.a.

	#1	Regular
Cu	2.13	
1/4 covered	2.40	2.30
1/2 covered	3.30	3.00
3/4 covered		3.30
All covered		

Regular at 1/4 covered

#1 at 1/4 covered

Regular at 3/4 covered

#1 at 1/2 covered

Same experiment with # 2

	# 2	Regular
on	8.40	8.40
Reversed	9.40	9.40
1/2 "	10.35	10.05
3/4 "		

Regular showed same characteristics as before
2 " " " as # 1

#3 5.5 grams Graphite
1.1 " $AgNO_3$ 20%
11 cc H_2O

#4 5.5 grams Graphite
1.65 " $AgNO_3$ 30%
11 cc H_2O

#5 5.5 grams Graphite
2.20 " $AgNO_3$ 40%
11.0 cc H_2O

#6 5.5 grams Graphite
1.75 grams $AgNO_3$ 50%
11.0 cc H_2O

All reduced in H kept at 520°C for 1 hour
let cool in H.

Tested with C.D. 100 M.A.

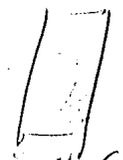
Cen	Regular Graphite	#3	#4	#5	#6
	11.18	11.18	11.18	11.18	11.18
1/4 covered	12.05	12.05	11.42	11.50	11.50
1/2 covered	12.36	12.45	12.10	12.33	12.19
3/4 covered	1.10	1.35	1.00	1.05	12.45
Total time —	1h 52 min	2h 17 min	1h 42 min	1h 57 min	1h 27 min
	1h 52 min	2h 17 min	1h 42 min	1h 57 min	1h 27 min

big little grains in time of plating

Treated the 50% $AgNO_3$ with hot water filtered added a little HNO_3 and HCl no trace of silver though the silver was not left in the $AgNO_3$ state but changed to metallic form

Treated the same 50% $AgNO_3$ with HNO_3 to dissolve silver added HCl big proof of $AgCl$ showing the silver was there

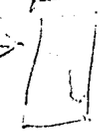
Note the strained form of plating



not found in 3 4 5 but a trace in # 6

3,4,5,6 all plate evenly [illegible]

instead of as in the [illegible] →



Exp. #1168

Tried the following method of grading. Made up 100 cc lots of the following % of $CaCl_2$ solution 30, 40, 50, 60, 70.

Put 25g Glass powder in 100 cc water stirred 1/2 min let settle 1 minute then poured off. what remained poured on the 100 cc of 30% $CaCl_2$ stirred 1/2 min let settle 1 min, then poured off, what remained poured on the 40% $CaCl_2$ stirred and let settle etc until the last on 70% was reached.

$CaCl_2$ + water rating

30%	$CaCl_2 + 6H_2O$	=	1,129
40%	" " "	=	1,176
50%	" " "	=	1,226
60%	" " "	=	1,277
70%	" " "	=	1,330

That which was left on bottom of 70% sol was fairly well graded, the rest contained too much fines. probably should settle much longer.

Exp. #1169

25 grams Glass powder thru 180 mesh run the same as in Exp 1160 except. used $\frac{40}{1000}$ opening run 1 hour when #1 and 2 were clear Saved #1 put #2,3, into #4 for separation with a finer stream of water while #1 was put back and separated further with a coarser stream using $\frac{51}{1000}$ opening.

Most of the glass ~~was~~ remained in Vessel #1 a little in #2 very little in #3 and 4 ~~nothing~~. Saved a sample of this #1

Ran fines with $\frac{20}{1000}$ & $\frac{30}{1000}$ opening. saved that remaining in Vessel #1 on the $\frac{30}{1000}$ opening also #2 & 3 as with the $\frac{20}{1000}$ very little came over

Started 25 grams using the $\frac{20}{1000}$ opening first
Time for 1, 2, 3, to clear = 3 hours
Saved Sediments in # 2, 3, 4.
Ran #1 using $\frac{40}{1000}$ opening
Time for 1, 2, 3 to clear = 1 hour 10 min
Saved Sediments in # 2, 3, 4. and ran #1 with $\frac{51}{1000}$ opening time for 1, 2, 3 to clear =

[illegible] sam with $\frac{60}{1000}$ opening sieved
Sediments in # 2, 3, 4.

Left in #1 the sam with [illegible] of
sieved Sediments in # 2, 3, 4. [illegible]
#1 which contained the finest coarse.

$\frac{20}{1000}$ time 3 hours

#2 | 1.200 grams (solid) | #3 | 1.500 grams (solid) | #4 | 0.580 grams (solid)

$\frac{40}{1000}$ time 1 hour

#2 | 1.930 grams | #3 | 0.520 grams | #4 | 0.140 grams

$\frac{51}{1000}$ time 35 min

#2 | 2.270 grams | #3 | 0.800 grams | #4 | 0.240 grams.

$\frac{60}{1000}$ time 35 min

#2 | 2.610 grams | 3 | 0.740 grams | #4 | 0.200 grams

$\frac{80}{1000}$ time 45 min

#2 | 2.300 grams. | #3 | 0.220 grams | #4 | 1.190 grams

Left in #1 7.470 grams.

1170

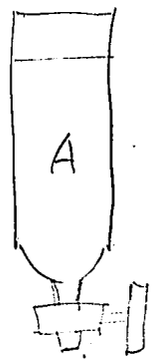
Settling of Glass Powder in Oils

Name of Oil	Viscosity	Sp. G.	Price gal.
Olive Oil from Phmotlks.	13 sec		3.00
Straw Oil	7 sec	870	27
Needol (Medium) "	20 sec	888	75
Extra Golden Mich Oil	13 sec	894	35.
Cannabis Oil	12 sec.	894	33

Tried the Straw Oil using a lipped tumbler
Stirred 1 minute at about 300 R.P.M.
then let settle
5 minutes poured off stirred again and let settle
10 " " " " " " "
20 " " " " " " "
30 " " " " " " "
7 ines. "

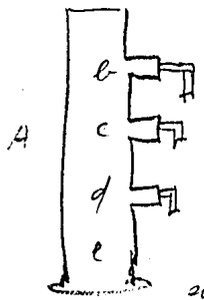
Cannabis Oil
Stirred 1 min 300 RPM let settle
10 min poured off Stirred 1 min let settle
1/2 hour " " " " " "
1 hour " " " " " "
2 hours " " " " " "
used 25g thru 200 mesh glass powder

Tried



10 grms glass powder thru 200 mesh stirred in Straw Oil time poured into A took sample of about 5 cc every ten minutes for 4 samples very hard to see a settling line.

1171



Filled A with Straw also other oils then mixed some glass powder thru 200 mesh with some of the same kind of oil as in A having the quantity of oil in the glass so much that it was then poured in in one lump. it did not mix with the oil but sank down in one lump. repeated having a paddle at b. rotating at 1000 R.P.M. then dumped in the thin slurry of oil and glass powder kept stirr. going for 1/2 to 1 minute glass powder settled thru the oil in clouds but not evenly distributed throughout the mass. also repeated same experiment using 4 paddles 1000 R.P.M. at b, c, d, e. and let settle 1 minute then drained thru the various openings but grading was not good

Tried pouring glass powder mixed with the following oils and pouring into test tubes filled with the same oil as the powder was mixed with all come down thus

Oils used Straw, Cosbrus, Neutral Medium, Olive, Cocoanut.

Tested Melting point of Sample of Cerezin.
Starts to melt at 58°C unmelted white spots throughout which do not clear up until 68°C is reached. M.P. taken in a capillary tube no stem correction made.

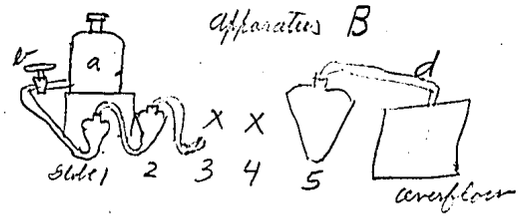
Put some glass powder thru 200 mesh, into 1000 cc graduate filled with 1 Liter water shook up let settle 1/2 hour poured off added another liter of water shook up let settle 5 min, poured off, added another Liter of water shook up let settle 1 min poured off, remainder classified as coarse.

25 grams glass powder thru 200 mesh put in elutriating apparatus using $\frac{20}{1000}$ disc ran until no more glass powder came out of the spouts of Vessels # 1, 2, 3, saved 2, 3 and 4 fines in overflow. then elutriated glass powder in # 1 Vessel using a $\frac{40}{1000}$ opening saving the sediments in 2, 3 and 4. repeated using $\frac{60}{1000}$ opening found no glass powder in # 4 or overflow. Note used glass made from Broken Pyrex Beakers.

Soft Lamp Bulb glass used previously reacts strongly alkaline when boiled with water

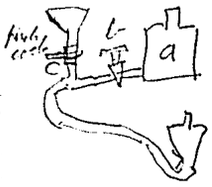
Exp. 1172

Apparatus B



Glass powder Pyrex Glass crushed ground, thru 200 mesh, washed again 500 cc distilled water dried. took of this 5 g placed in Vessel 1 with water shook up and connected at b. then started water and regulated it when it came out at d to about 200 drops per min let run until Globes 1 2 3 4 were clear. stopped. (Tried once to start it on another batch without shaking # 1 had to blow into a tube quite a little pressure which probably forced some of the coarse over into 2 and 3.)

Exp. 1173 Same apparatus as in # 1172 except. interposed funnel at C



Closed pinch cock filled Globes with distilled water regulated to 200 drops per Min then opened Pinch Cock. then added a slurry of 5 grams of Glass powder by shaking in a small beaker with distilled water added gradually by pouring into funnel in such a way that no air was carried into the globes, this can be done if the slurry is added very gradually. ran until globes 1 2 3 4 were clear.

too much fines in coarse not a good seperation

1174 same as 1173 except. mixed 10 grams glass powder in a mortar transferred to a beaker then poured it slowly into the funnel washing the glass powder constantly. Stopped rate of flow 200 drops per minute which was increased to 300 drops per minute will try the same with powdered quartz

1175 Same as 1173 except. Rate of flow 360-350 drops = 75 cc per minute Used quartz thru 200 Mesh washed with distilled water 7 times and made slurry by rubbing lightly in a mortar then transferring to a beaker and added slowly under constant agitation of the beaker.

Mr. Edison said after examining under microscope (Jan 20/21) that this grading was OK up to

1176 Same as 1175 except. rate of flow 35 cc per min.

5 and 5 overflow which I should collect and try to grade.

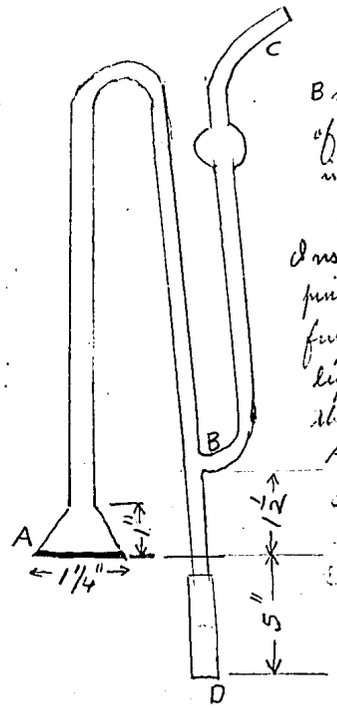
1177 Same as 1175 except flow of 56 cc per min = 250-260 drops per minute.

1178 Took nearly all the powder from #5 and S overflow from experiments 1175-1176-1177 and tried grading them same as in the three previous methods experiments except that the flow of distilled water was reduced to 100 drops per minute.

1179 Settling Exp. Quartz thru 200 mesh then reground in ball mill until very fine took 10 grams mixed in a mortar then put into a 1000 cc Graduated Cylinder shook up thoroughly let settle 15 minutes poured off carefully into another 1000 cc cylinder shook this up thoroughly and let settle 1 hour then poured off into another cylinder etc. saved the settlings did not filter them off but removed them into glasses with a jet of water and let dry over night 1/2 inch above hot plate in pouring out of such a long cylinder some of the fines still remain on the side walls. Settlings as follows 15 minutes 1 hour 2 hours 3 hours 15 hours and

Mr Edison thought these settlings were good except the 15 minute one.

In order to improve the pouring out process Mr. Edison suggested a syphon with a wide opening at the suction end. so constructed the following and observed some conditions under which it will work.



B must be about 1" above level of A and D about 2 or more inches below A

Method

I insert syphon with A in liquid pinch the rubber tube D with finger and suck at C until liquid comes well over bend then release at D

A has a black sun around it so the funnel can be seen in the liquid (Lump Black & Linseed.

I can get all out except 10 cc of the liquid which stretches back when syphon stops A can be brought so close to sediment that it almost touches it.

if we let the 10 cc stand a minute or so by carefully tilting cylinder this also can be removed by pouring as the weight of water above the sediment is so small that it does not disturb the sediment if carefully poured.

1180 95

Melting Point of Samples of Ceresine Wax
Recd Feb. 2/21.

	Degrees C Degrees Bath Bacon.	Degrees F.
3 samples White Synthetic Ceresine Wax		
from. The Merchants Export Co		
1 Quality Court Chancery Lane W.C. 2		
# 7457	55-66	
# 6088	64-75	
# 8013	50-52	
3 Samples Ceresine Wax.		
from K. Malmberg 110 Cannon St.		
London E.C. 4.		
# 1896	50-64	
# 1897	45-53	
# 1898	49-54	
2 Samples White Ceresine Wax.		
from Neville & Raymond Ltd.		
# 102	54-71	
# 117	51-64	
M.P. Ceresine according to Merchs Index and Chemical Dictionary 74-80° C Capillary Tube Method		

95

Samples of Wax Feb 9/21
British Wax Refining Co Ltd. (3 Samples)
London

No 14	52	70
	52.5	68
	52.2	69 °Cent
No 12	52.5	60
	53.	59.5
	52.7	59.7 °Cent
No 13	52.5	65
	55.	65
	53.7	65 °Cent

Sample of Stearic Acid
from Mc Williams Wax Division Silver Lake
Smith & Nichols Stearic

1 st.	55-	56 °C	big Bath
2 nd	54.7	55.8	
3 rd	54.6	56.1	
Average	54.76	55.96 °C	
	55.03	56.23	Stem Correction

Stearic Acid should melt at 69.32 °Cent.

Stem Correction .00016°C X N (T-t)
N degrees emerged from bath
T temp of bath
t average temp of Room
.00016 X 56 X (56 - 25) .2777 degrees

Ceresine Wax

From Sterns Ltd. Royal London House
Finsbury Square E.C.2 London.

2 samples

		Begins to Melt	Clear	another Method as check.
Sample A	1st	51.5	65	51 – 64
	2nd	50.5	65	
	Average	51.	65 °Cent	
		123.8	149.0 °F.	
Sample B	1st	50	54	
	2nd	50	54	
	Average	50	54 °Cent.	
		122.0	129.2 °F.	

Checked by method of sucking molten wax into capillary tube sealed end let lay 2 hours before taking M.P.
According to Letter
A melts at 145 - 147 °F
B " " 135 – 137 °F.

Stem correction 0.277°C

Sample of Stearic Acid from McWilliams Wax Division Silver Lake rec'd. Feb. 10/21 marked Century Stearic Acid

1st	48	55	
2nd	48	54.5	
3rd	49	55.5	
Average	48.33	55.0	
	48.53	55.29	Stem Correction
	55.03	56.23	1st sample cent
	6.50	.94	Difference

Stem correction $.00016 \times 48.33 \times (48.33 - 22)$
$.00016 \times N \times (T - t)$

50 grams E & A Silica ground fine then floated discarding fast which settled in 5 min. washed water displaced with distilled, dried.

1st Sieve

1 Settled in 15 min	16.0030		Total 31.0050
2 " " 1/2 hour	8.7720		
3 " " 1 hour	6.2300		
4 " " 2 hours	5.3020		
5 " " 3 hours	3.0735		
6 " " 6 hours	2.6300		
7 " " 17 hours	3.2500		
8 7 mins 7 floating after 17 hours	4.2900	Loss = 4295	
	49.5705	= 2.1475 Karats	

Second Sieve

15 Min Settled in 8 min	9.4660	
" " Floating after 8 min	6.3010	15.7670
	15.7670	
1/2 hour Settled in 15 min	3.3275	
" " Floating after 15 min	5.2900	8.6175
	8.6175	
1 hour Settled in 1/2 hour	2.2700	
" " Floating after 1/2 hour	3.8065	6.0765
	6.0765	30.4610

31.0050
30.4610
.5440 grms
2.7200 Karats

Loss on 1,2,3, second Grading

Total Loss 2.1475 + 2.7200 = 4.8675 Karats

Removal Diamond 1st Batch Mud

68.1400
36.2500
31.8900
5
159.4500 Karats Thru 200 Mesh.
1.7750
161.2250
Karats Total

.3550g Remaining on 200 Mesh
5
1.7750 Karats

Delivered to Mr Smith for Mr Gibsons Request from 1st Got. Model.

Grade 4	3.6350	Karats
5	3.3275	
6	[illegible]	
7	[illegible]	
	36.7850	Karats

On Hand Grade 1
2
3

Grading

50 Karats Diamond Dust thru 200 mesh graded as follows

In the order named.

#5 Floating after 4 hours	part which settled
#1 Settling in 1/2 hour	part which floated
#3 Settling in 1 hour	
#4 Floating after 1 hour	
#2 Floating on second treatment of the 1/2 hour Settling.	

#1	26.2700
#2	4.0525
#3	7.1175
	37.4400 Karats I.A.E. selected
	74.88% to be used
#4	7.4800
#5	4.2450
	11.7250 Karats to be sold 23.45%
	37.4400
	49.1650 Total
Sand from Leather scrapings	.2500
	49.4150

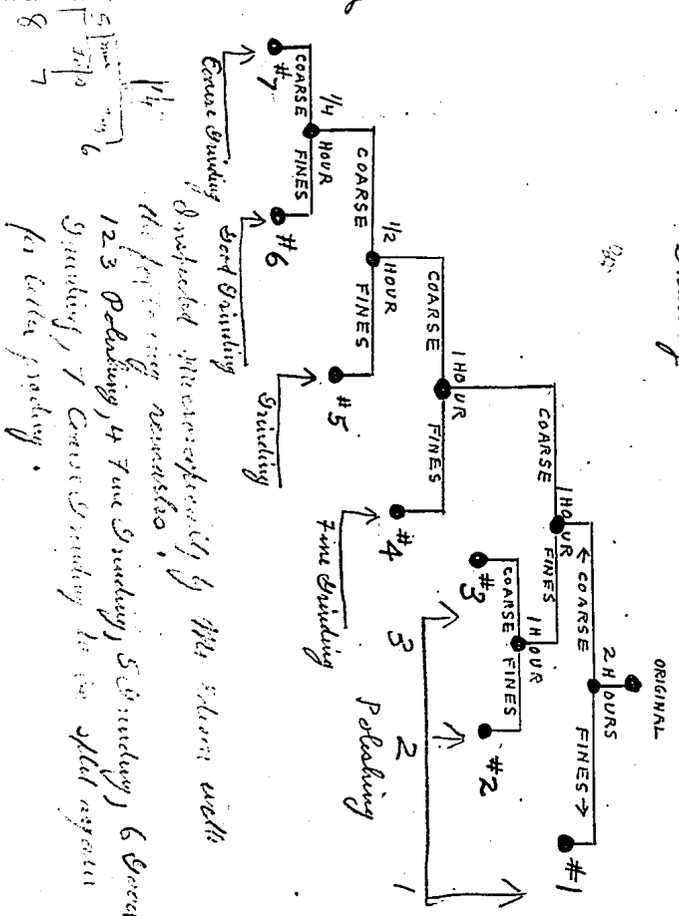
50.0000
49.4150
.5850 = 1.17% Loss in Karats.

Mon 23/21

Grading Recovered Cleaned

Deducted Dust thru 200 Mesh. 10 g or 50 Karats

Graded in Distilled water using a 100 cc Graduate.



Grading & Cleaning.

Deducted Microscopically by Mr Edwards with the following results

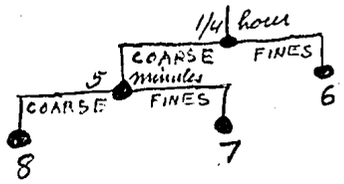
123 Polishing, 4 Fine Grinding, 5 Grinding, 6 Med Grinding, 7 Coarse Grinding to be sold separately for better grading.

#1		#2		#3			
Total	4.6652		4.9200		6.9146		
	4.3300		4.7237		4.9410		
Grams	.3352		.1963		1.9736		
	5		5		5		
Karats	1.6760		.9815		9.8680		
#4	5.7240	#5	6.1405	#6	5.8810		
	4.9970		5.4350		4.7225		
	.7270		.7055		1.1585		
	5		5		5		
	3.6350		3.5275		5.7925	50 stones	
#7	9.1130						
	4.3470						
	4.7660						
	5						
	23.8300						

# 1	1.6760	Karats	
2	.9815	"	
3	9.8680	"	
4	3.6350	"	"
5	3.5275	"	"
6	5.7925	"	"
7	23.8300	"	"
	49.3105	50) 36.7850	
Recovered from leathers	.0620	= 73.57%	
	49.3725		

Delivered to J M Smith

Grading Diamond 50 Karats
Same as # 1184 except made another split at. #7



#1 Total	6.1760	# 2 Total	5.5582
	4.8270		4.4120
	1.3490		1.1462
	5		5
	6.7450		5.7310
# 3 Total	5.3920	# 4 Total	6.5880
	4.6562		6.0060
	.7358		.5820
	5		5
	3.6790		2.9100
# 5 Total	6.6030	# 6 Total	6.2880
	5.9200		5.4870
	.6830		.8010
	5		5
	3.4150		4.0050
# 7 Total	6.2580	# 8 Total	10.1040
	5.4130		6.3840
	.8450		3.7200
	5		5
	4.2250		18.6000

1 6.7450 Karats
2 5.7310
3 3.6790
50) 16.1550 (32.31% Polishing?
150
115
100
155
150
50

16.1550
33.2550
49.4100

4 2.9100
5 3.4150
6 4.0050
7 4.2250
8 18.6000
50) 33.2550 (66.51%
300
325
300
255
250
50

2nd Lot Mud

Thick Diamond Mud from Grinding Operation

Total 222 grams
Beaker 55 ✓
167 grams Total

Rags paper etc = 11.50
Metal parts foil mounts bearings etc = 9.00 grams.
20.50
5 mounted points for inspection.
Treated separately up to the HFl treatment.

Acetic Ether used 200 + 100 Washbottle for screening = 300
= 200
= 200
= 200
Total Acetic Ether 900

Benzol 100 cc
" 100 "
Total Benzol 200
Recovered 650 cc
Acetic Ether

✓ 50 cc H_2SO_4 conc.
✓ 50 cc " " 50%
✓ 75 cc HNO_3
✓ 100 cc HNO_3 conc
25 H_2O
✓ 60 g $NaClO_3$

✓ 10 cc H_2SO_4 conc
✓ 40 cc HFl

Treatment of Rags etc
Water 50 cc
✓ H_2SO_4 25 "
✓ HNO_3 [illegible]
" 50
50% H_2SO_4 50 cc
✓ HNO_3 50 cc
✓ HNO_3 25 cc
✓ $NaClO_3$ 5.5 g.

Sum Total
167 grams Mud
20.5 " Rags Metal etc
176.5 grams

Acetic Ether 900 cc
Recovered 650 cc
Used 250 cc

H_2SO_4 85 cc concentrated
" 10 cc 50%

HNO_3 300 cc
$NaClO_3$ 65.5 grams

HFl. 40 cc

Recovered in [illegible]
5 mounted Points
4.1550 Karats Remaining on 200 Mesh
180.1575 Karats Thru 200 Mesh

Received April 12 Tuesday

Flattening operation Pearwood Mud 20 grams
Hand Rounding " " " 22 grams.

Flattening 1420
1400
20

Large scale Hand Rounding 1567
1545
22 grams

Hand Rounding Received 7.9675
5.0700
2.8965 g.
5
14.4825 Karats.

Flattening Received 9.2800
5.7700
3.5100
5
17.5500

Analysis of Shino May 5/21

1g Shino $Pb(C_{20}H_{29}O_2)_2$ should contain
.2259 Pb
.2301 Pb Found
.0258 Pb or 2.58% too little lead
809.1 should contain 207.1 Pb
$\frac{809.1 \times 2301}{207.1} = .8992$ or 89.92%
Lead Resinate leaving 10.08% uncombined Rosin
~~Neutral~~ Hot water extract neutral to Methyl Orange.
Trace of nitrates by the brown ring test
Good Trace " with the Diphenylamine Test.

May 19/21

Report to Mr. Hanlon.

Test of a Sample of Para. received from Silver Lake
M. P. indefinite commences 135°C fully
melted at 137.5°C should be 140°C
2.5% insoluble in warm Alcohol
100cc H_2O should contain 3.7g Para
found 0.470g undissolved

Recording Mixture for use on Strings
used on Dr. Gibbs Moulded Defect Indicator
Mixture #6

10 grams Babbits Soap from Store Room
3.5 grams Glycerine
1/2 gram Lampblack

All Mixed well in a Mortar.

Changed to Babbits Soap (Best) from Store Room
10 grams
Glycerine 15 grams
English Vermillion 20 grams.

June 1/21

Experiment for making Nickel Labels Stick to Mould & sticking on flute glass.

Here method consists of giving the Label 1 coat of thin Shellac Varnish with a brush drying in air then 2nd coat drying then a little just around the edge and drying then pressing by use of a rubber pad in the press at 250°F. 4 minutes with steam on and 5 minutes cooling.

On account of using glass used following schedule 6 minutes with steam on 8 minutes cooling.

Made the following varnishes and tried as above. Thin Shellac Varnish

Koppers Resin 10 grams Benzol 20 cc
3 coats same as regular method 6 minutes Steam 8 minutes cooling

Prime Cuban Asphalt 10 grams
Benzol 20 cc

A Made a solution 10 grams shellac ~~to~~ 40 cc Denatured Alcohol dissolved let stand over night decanted leaving sand out behind

~~Th~~

#1 1/10 cc of A + 2 cc Alcohol + 2 grams Dixons Electrotypes Graphite. Not enough shellac to make a body does not paint on well

#2 3/10 cc of A + 2 cc Alcohol + 2 grams Dixons Graphite Not enough body of shellac does not paint on well.

#3 6/10 cc of A + 2 cc Alcohol + 2 grams Dixons Graphite Not quite enough shellac to paint on well.

#4 1 cc of A + 2 cc Alcohol + 2 grams Dixons Graphite not enough shellac

#5 1½ cc of A + 2 cc Alcohol + 2 grams Dixons Graphite Just enough to be good could probably stand a little more graphite

6 $1\frac{1}{2}$ cc of A + 2 cc alcohol + 2 g Graphite
Dixons Electrotyping Graphite #649

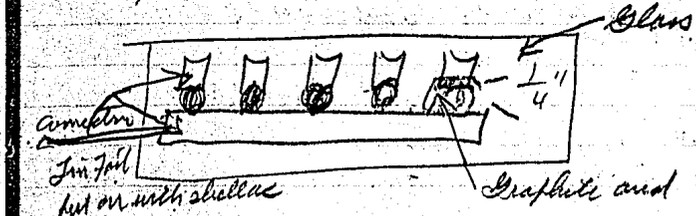
7 1 cc of A + 1 cc alcohol + 1/2 g Graphite
Dixons Electrotyping #649

8 $1\frac{1}{2}$ cc of A + 1 cc alcohol 1/2 g Graphite
Dixons 649

9 2 cc of A + 1 cc alcohol 2 g graphite
Dixons 649

10 3 cc of A no alcohol 2 g graphite
Paints on the best as there is enough shellac to ~~make~~ give it some body.
Dixons 649,

#6, 7, 8, 9, 10, mounted as follows



Put in Regular Copper plating bath.
3.00 MA. Rate all 5 plated over in 5 minutes let on for 1 hour.

Superfine Orange Flake Shellac Sp. G. 971-73
assured for making diaphrams, price June

Egyptian Lacquer Company: Shellac Varnish
00V Sp. G. @ Room Temp 34° C, .924

11 3 cc Egyptian Shellac Varnish not debited
+ 2 grams Dougherty's Graphite

12 2 cc Egyptian Shellac Varnish + 1 cc Denatured
Alcohol from Record Plant + 2 g Dougherty's Graphite

13 2 cc Egyptian Shellac Varnish + 2 cc Denatured
3 cc of Alcohol from Record Plant + 2 g Dougherty's Graphite
8 cc + 8 cc or 12 cc + 8 cc

14 1 cc Egyptian Shellac Varnish + 2 cc Denatured
Alcohol from Record Plant + 2 g Dougherty's Graphite

15 1 cc Egyptian Shellac Varnish + 3 cc Denatured
Alcohol from Record Plant Took 3 cc of this + 2 g Dougherty's
Graphite

All the above painted well.
Paint must be thick enough not to sear
Graphite for smooth work must be very fine and
well incorporated in the liquid free from lumps.
Shellac Varnish must be clear, that is
free from the waxes formed clouding shellac
when dissolved in Alcohol
Tried 11, 12, 13, 14 Start 3.21 off
5.21 = 2 hours.
#14 covered 7/8 in 5 minutes totally in 10 minutes
13 covered 7/8 in 20 minutes
12 " 3/4 " " "
11 " 1/8 " " "

13, 12 then covered all over in 1 hour
but #11 did not cover dark spot which did not
cover in 2 hours

Copper Bath 300 M.A.

Ran a duplicate using # 13, 14, and added 15

#15 All covered over ~~[illegible]~~ in 10 minutes except slight spot

#14 " " " " "

13 7/8 " " " "

All of them totally covered in 20 minutes.

Ran 13, 14, 15,

in Nickel Bath 300 M.A.

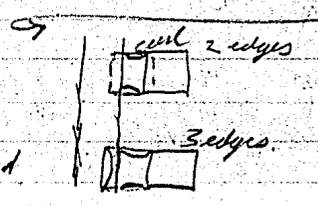
13 Covered in 10 minutes

14 Slight Spot " "

15 " " " "

All of them totally covered in 20 minutes.

13 flat. 14 started to curl up.



15 curled

Conclusion. Egyptian Lacquer Mfg Co's #00K Shellac in Alcohol is too concentrated when used straight but will work if only diluted 2 Lacquer to 1 Denatured alcohol as in # 12 but find the best to be. # 13, 14, and 15, which are.

13 – 2cc Egyptian Lacquer 2cc Denatured Alcohol from Record Dept. + 2 gr Dougherty's Refined Graphite

14 ~~Same as 13, slight~~ 1cc Lacquer to 2cc Denatured alcohol 2 gr Dougherty's Graphite.

15 1cc Lacquer 3cc Denatured alcohol took 3cc of this Mixture and added 2 gr Dougherty's Graphite.

Mould # 80293 R

Test of Benzol Sample Received
August 16 1921. Drum Marked
Benzol Chas Cooper & Co [155]

C.C.	Deg Cent.	
1st Drop	78 2/5	Test for Thiophene 40 cc Benzol
10	79 2/5	+ 10 cc Conc CP. H_2SO_4 well shaken
20	79 2/5	H_2SO_4 should remain water White
30	79 2/5	(Slight Yellow color of this Paper)
40	79 2/5	on adding few crystals of satrie
50	79 2/5	shaking then let stand no green
60	79 2/5	color should develop in 1 hour
70	79 2/5	(slight green color in 10 minutes
80	79 2/5	dark green in 1 hour.
90	79 3/5	
95	79 3/5	CS_2 50 cc + 50 cc Alcoholic Potash
99	80	(11 g KOH in 90 cc abs. Alcohol)
	80.0	Shake let stand for several hours
	78.4	add 100 cc Water shake let settle
	1.6 %	separate watery layer Neutralize
		with Acetic Acid and add
	79.6	Copper Sulphate Solution should
	78.4	give no precipitate of Copper sulphide
95%	1.2	

Required 8.4 cc
= 0.1276 g CS_2 per 100 cc

Test of Benzol Received
aug 20/21 Drum Marked Benzol
from Chas Cooper & Co [223]

1st drop	78.3	Test for Thiophene
10	79 1/5	Dark green nearly Brown Hour.
20	79 2/5	(Contains apparently as much
30	"	Thiophene as sample from 155)
40	"	Required 6.5 cc for CS_2 Test
50	"	10076
60	"	6.5
70	"	380
80	"	456
90	79 3/5	04940
95	79 3/5	2
99	80	09880 g CS_2 in 100 cc
	78.3	
	1.7	

Paraphenylenediamine

From Sherwin Williams Co see letter Aug 15/21

Melting Points commence	139	Fully melted	140.2
" " "	139	" "	140.2
	138	" "	139.7
Average	138.6		140.0

Solubility in Water 3.7 g. totally dissolved except a few unweighable flakes.

Solubility in Alcohol Denatured.
5 grams. residue insoluble .047 g.
= .0094 insol in 1 gram or 0.94%

M.P. of Diacetyl compound made from the Para 300.0

For Diacetyl test see Mulliken Vol II Page 112 (877)

	Para	The Seydel Mfg Co
From	138.0	138.5
	137.5	139.5
	137.0	139.7
	3) 411.5 (	3) 417.7 (
Average	137.16	139.2

Solubility in Water 3.7 g all except a few flocks.

Solubility in Alcohol 5 g. insoluble .060 g
= .012 g = 1.2% insoluble
Acetyl compound Just melts at 301 limit of thermometer

In Both samples residue insol in alcohol crystals soluble in water give sodium flame reaction, negative to chlorides and sulfates not quite positive reaction for acetic acid & the alcohol H_2SO_4 reaction evolving acetic ether

Sample of Paraphenylenediamine received
Sept. 15/21
M.P. Average = 139.0

" " Diacetyl Average = 298.0 Av.
5g Dissolved in Alcohol 1.128% Residue
White crystals of Sodium Acetate.

3.7 grams completely dissolved in water except a few flakes.

Mr Edison says tell Hoffman I said it was OK.

Sept. 29/21

Test of Felter material from Albany Felt Co Albany N.Y. 4 Samples # 213, 213 Special, 208, 212.

Instructions

Cut each sample of cloth into 5 pieces immerse 4 pieces in Fast Plating Solution obtained from Fast Plating Baths, keep Temperature at 130°F. Take out one piece every 24 hours, wash in water and give to Mr. Edison for inspection mark on the Beaker shows level which is kept thru by addition of water to replace water evaporated, save solutions for further analysis.

All on Sept. 29th (Thursday) at 9.15 AM
1st sample off Sept. 30th at 9.15 AM.

Report 1st 24 hours

213 2 Rotten after 24 hours

213 Special OK all way through
for Strength 96 hours in Bath

208 OK all way through
for strength 96 hours in Bath

212 No good: Rotten after
48 hours

Inspected by D.A.C. and recorded
in book as he gave results to me.

Solubility of Waxes, Pitches, in various solvents.

1 Japan wax .0095g in Alcohol Partial Solvent.
2 " " " Benzol saturated sol
1 cc Benzol contains .210 grams Japan Wax.
3 Japan Wax .026 in Acetone Partial Solvent.
4 " " in Carbon Tetrachloride saturated solution 1 cc contains .170 grams Japan Wax in CCl_4

5 Stearine Pitch in Alcohol .0030 Partial Solvent.
6 " " " Benzol Sat. Sol
1 cc contains .130 grams Stearine Pitch in Benzol
7 Stearine Pitch in Acetone .060 Dissolves Some
8 " " " Carbon Tetrachloride
Sat Sol in CCl_4 1 cc contains .155 grams Stearine Pitch

9 Gilsonite in Alcohol .0001
10 " " Benzol Sat Sol in Benzol 1 cc.
contains .160 grams Gilsonite
11 Gilsonite in Acetone .0025 g
12 " " Carbon Tetra Chloride
Sat Sol in CCl_4 1 cc contains .100 g Gilsonite

13 Black Azoherite in Alcohol. Partial solvent — Alcohol clear colorless with white flocks in it.

14 Black Azoherite in Benzol Dissolves but gives a flocculent black precip color of Solvent light brown

15 Black Azoherite in Acetone Partial Solvent. Solvent Light Straw with white flocks

16 Black Azoherite in CCl_4 dissolves with a medium brown color to solvent and black precipitate.

13	Azoherite	in	Alcohol	Insoluble
14	"	"	Benzol	.0470 smells of Rosin
15	"	"	Acetone	.0010 g
16	"	"	CCl_4	.0510 g.
17	Montan Wax Crude		Alcohol	.0040
18	"	"	" Benzol	.0130
19	"	"	" Acetone	.0050
20	"	"	" CCl_4	.0145

Oily matter on Bag brought in by A. Hoffman.

Dissolved totally in benzol evaporated off benzol.

Tests.

Wedeshold Reaction

Only more trace sol in Acetone.

Rosin Sol in acetone in all proportions mineral oils not. Some few cylinder sparingly.

Insol in Alcohol

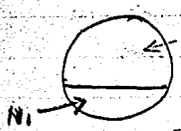
Sol. in Ether.

When heated smells of paraffine

Storch Reaction for Rosin Oil Negative.

Experiment to Remove adhering Nickel from Master Moulds.

Solution 20% H_2SO_4 5000 cc to make
Take 4388 cc H_2O + 612 cc H_2SO_4 1.848 Sp. G.
Heat on pads 1/8" from Hot Plate.
Temp. 160–170 °F.



This mould was put in 4.10 PM out 12.15 Temp. 170 °F.
This was a tracked blank.

Observed the gas bubbles were formed only where the Nickel was plated on, when nearly the last trace of Ni was off only a few bubbles could be seen on the Cu, the entire surface of the mould except where the Ni was remained perfectly bright until taken out, washed in water then put in distilled water over night, found it brown spotted in the morning.

Second Trial

This was left in from 12.30 to 8.30 o'clock same conditions as above found apparently traces of Ni left on a stain thereof, at 8.30 but removed it and washed, covered with bubbles and brown spots, rubbed, polished, full of little pin holes, apparently where the brown spots

occured.

3rd Trial same conditions as 1st one except left in sol. from 12.30 until 4.30 covered with brown spots, washed, examined under microscope each brown spot was a pin hole and looked like a minute spot weld.

Nov 27/21

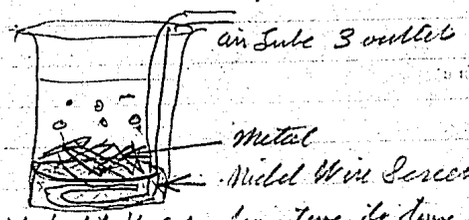
Sample of Liquid from Mr Edison
supposed to be. Cleaner marked
.375%
Evaporated 10 cc found
14.5105
14.4737 Glass
.0368 grams left = .368%
= 3.68 grams in 1000 cc for 2000 cc
use 7.36 g.

Method for. Recovery of Metal Drum
Drummings Plate Plating.

#1 10 grams of the Fine cuttings
in 20% H_2SO_4 on Hot Plate (Asbestos Pad)
Temp 130 – 140 °F.
On. Wed Dec 14 at 5.30 PM.

#2 10 grams of the Fine Cuttings in
20% Na Cyanide room Temp.
On Wed Dec 14 at 5.30 PM.

#3 10 g Metal 150 cc Storage Battery Seperating Sol air. Temp 130–180 on Dec 15 at 11.45 a.m.



added dil H_2SO_4 from time to time to redissolve precip.

#4 10 g metal 100 cc 20% Na Cyanide on 3.20 PM Dec 15 at 130° F.

Note Cyanides H_2SO_4
for clean

#5 Edge Trimmings cut in 3/8" squares. Big Battery Sep Sol. Temp 160–180 on Dec 20 / 8.30 AM.

operating with Air	8 hrs.	20th	Total hours Bath	24
" " "	8 hrs.	21		24
" " "	8 "	22		24
" " "	8 "	23		24
" " "	36/4 "	24		24
		25		24
		26		24
	8 h	27		24
				192 hrs.

at End of 36 hrs about 3/4 – 7/8 finished at 44 hours.

Sample of Ore from Mussel Shoals

Moisture 110°C	4.48 %
After Moisture Loss on Ignition	12.17
Insoluble HCl HNO_3	43.55
Iron Alumina as Al_2O_3 Fe_2O_3	23.32
Manganese figured as Mn_3O_4	19.78
	103.27 %

Trace Cobalt & Ni. Trace.
Zinc Trace.

Coating for Wooden Pails

Wooden Pail Poured in Hot Mango Pitch having previously heated pail on Hot Plate ran pitch around 4 times then drained cooled, filled to waste with 25% HCl Sp. G. 1.25 Commercial the HCl boiled pale muddy before filling into pail. Placed under bench with Earthen Ware cover on.

On Dec 23/21 at 4.00 P.M.

Formula

7.3 grams Phenol

1.0 " Paraphenylene Diamine

1.0 " Gum Sandarac

0.1875 Myrosine M.W. Heller Mey.

7.9 grams Hexamethylene Tetramine

All dissolved in 200 grams of alcohol #1 Special #4 denatured

= ~~about~~ 250 cc.

Agitate 2½ hours. Filter

To Filtrate add 100 grams Phenol Resin 15% fractional
then fast left out.

Are made at 70° F.	55.1069
	54.7788 Blank Paper
Resume after washing with warm water	.3281
Are made at 55° F.	55.2271
	54.8148
	.4123

Mar 16/22

Distilled 100 grams Stearic Acid M.P. 55.5-56
in Naccio 24.5 "
Started to distill at 279 and gradually went
up to 300 when operation was stopped
13.4 % distilled over

M.P. distillate Started 53 fully melted 54
" " remainder left in flask Started 52.5
fully melted 55.5. Report to J.A.C.

April 5/22

Trying Out New Edisphone Cylinder Mould
Made by Mr. Edison.

Total Time Start 1.45 Stopped 4.45 = 3 hours
made 18 moulds.
Temp of Pouring = 360°F. - 370°F.
Time to put in Cloth backing, Bevel and Pour.
= 1 minute

Following is the time schedule beginning
with the mould at room temperature

1st Trimmed off Top at 3 minutes
Removed Bevel at 4 min ejected at 4 min
Stuck a little.
2nd Trimmed 3 minutes
Removed Bevel 4 min
Ejected 5 min — 5 min
3rd Trimmed 4 min
Removed Bevel 5 min
Ejected 6 min — 6 min
4th Trimmed 5 min
Lifted Bevel 6 min
Ejected 7 min — 7 min
5th Trimmed 6 min
Lifted Bevel 7 min
Ejected 8 min — 8 min

6. Turned 8 min
Removed Bevel 10 min
Ejected 10 min 10 min.

7 8 9 10 11 12 13 14 15 16
17 18 all same time schedule
as #6.

2 were spoiled by forgetting to remove
bevel before ejection

Sent the rest 16 to McWilliams
for turning and inspection as to size
pin holes etc.

The First Five will probably not be
good as it takes this length of time
to get the mould up to temperature.

All ejected very easily except the first
one or two.

Cylinders are very hot when ejected and
quite soft harder at the bottom
where they can be taken in the hands
without squeezing if handled carefully

Exp to try avoiding mushrooming on bottom also flat spots on side

#1 Poured after making several pours.
Temp Wax 370°F.
Time 8 min Drain
10 min Removing Bevel and ejecting –
Ejected very slow.
Very Straight Mushroomed about 1/64
#2 Ejected Quick put on card board
Top side down Cavedrawn spot about 1/16
deep.
#3 Ejected Slow Top side down
cave drawn spot 1/16

#4 Ejected Slow Top side down
1/16

#5 First one poured before #1 mushroomed slightly.
good

May 24/22

Experiment to remove blacking effect of Benzol on copper moulds.

200 cc Benzol about 1½ to 2 grams fine copper turnings put in placed 1" above hot plate with a tube condenser let stand 1 day and 1 night took off poured benzol into another container added fresh copper turnings repeated exp. 1st lot copper turnings dead black second lot not touched so tested benzol for CS_2 and found .400 % Original Benzol .45 % CS_2

Conclusion this tends to show that CS_2 does not attack the copper but that either free sulphur or other sulphur compounds do. and that these are removed by the copper.

Repeated above experiment at ordinary room temperature and obtained same result showing that heat is not necessary.

did not agitate much this also shows that the heavier sulphur compounds must go to the bottom of the liquid.

Purifying with the Alcohol Potash method takes out the CS_2 nearly complete leaving only .01% using 1 quart Alcohol and 100 grams NaOH solid. for every 5 gallons Benzol. mix let stand 1 hour add water and wash with water until Lead Acetate does not give any more precipitate in the washings then added a little $CaCl_2$ to remove most of the water and distilled.

Proportion

100 gallon drum of poor Benzol that is heavy .24% CS_2 and much thiophene requires 6½ lbs Copper turnings as recovered from blancy, wash turnings in Benzol to remove Vaseline then put in drum and stir 3 times a day keep in drum 1 week then test.

By drawing off sample put in Erlenmeyer flask with reflux condenser and put in a new washed piece of copper turning about 1 gram let stand 1½ above hot plate for 5 hours.

June 15/28

Sample Nickel Sulphate
From Harshaw Fuller & Goodwin Co
New York

H_2S group (as Lead Sulfide etc)	Trace
Iron	.0003
Lime Magnesia Etc	None
Chlorine as Chlorides	Trace
$NiSO_4 6H_2O$ by Glycerine Method	99.99

Took 1000 grams dissolved in Dist Water
boiled down then let crystallize filtered off
mother liquor, boiled this down let cryst (2 cryst)
then filtered off mother Liquor (2nd Mother Liquor)
brought up to 1000 cc with water took 200 cc
aliquot.

Analyzed

Total Ni as $NiSO_4 6H_2O$ in mother liquor =	128.25 grams
Total H_2S group for Copper in Mother Liquor =	0.0015 grams
Total Fe and al precip as Oxides in " " =	0.1565 grams
	.1500
	.0065

12.5585
12.5222
.0313 x 5 = .1565 g

#1 Exp on Japan Wax.
80 grams of Old Japan Wax dissolved in
400 cc hot Denatured Alcohol in a seperatory
funnel Stirred well, let settle, found
a layer on bottom undissolved this was
run off in a dish put on hot plate to
evaporate alcohol cooled
Weight 41.4
Mr Edison scratched surface with penknife
let exposed to air it becomes foggy.
Wax is hard. not sticky
color dark brown

Part soluble in hot alcohol let cool
at room temp. some Wax seperated
out this was filtered off on Vacuum
Filter put in dish on hot plate
to evaporate alcohol
Weight 20.8

Mr Edison scratched surface with penknife
then exposed to air surface becomes foggy.
Wax is hard not sticky
color light brown

Part soluble in the cold alcohol put in beaker on hot plate and evaporated off alcohol

Wt. by difference 17.8 grams
This part of wax is soft like Vaseline, color dark brown.

#2 New Wax treated same as #1 with alcohol. 80 g Wax 400 cc Alcohol

Part insol in hot alcohol slightly sticky softer than the old wax. treated same way
Weight 50 grams color nearly white
40 grams of Regular wax + 10 grams of this poured into mould, let cool, and exposed to air.
Part which crystallized out of alcohol on cooling is sticky and much softer than old wax treated same way.
Weight 12 grams color nearly white

Part soluble in cold alcohol soft like vaseline light brown in color.
Weight by difference = 18 grams.

#3 Gasolene

80 grams wax old + 400 cc Gasolene
treated same as #1

Nearly all dissolves except a few particles left on filter paper when filtering hot. this has some dirt in it

Part crystallizes out of Gasolene when cooled in ice box.

Part soluble in cold Gasolen

#4 Benzine (Petroleum)

#5

Took 50 grams Wax 10 grams Borax dissolved borax in 200 cc Water then put in wax and boiled till went to a jelly which solidified like soap on cooling

Took some of this and boiled off the water and poured in a dish gives a very dark brown cake which has lots of air bubbles in it and is hard and tough

#6

Same as #5 except used 1/2 gram borax.

only partly saponified washed off saponified part from cake which hardened on top of beaker.
Weight 21 Grams
This cake is a little soft dark brown color

Took of this cake and heated it to drive of any water poured probably a little overheated color nearly black. a little soft.

7 80 grams new Wax + 100 cc 30% NaOH + 100 cc water saponified the wax by boiling finally diluting to 1000 cc apparently completely saponified precipitated fatty acids Wash etc with HCl until slightly acid boiled in Water 3 times to free of Acid and Salt. Melted to expel water poured into mould.

#8

80 grams Wax Cold boiled in 400 cc Water then let cool lift off top layer, and evaporated Water soluble this left about 1 or 2 grams of a soft sticky substance.

Part insoluble in water very dark. hard but slightly sticky, has a good shine except. some matt spots Mr. Edison satisfied with fantastic when exposed to the air
Weight 52.2 ? try again if necessary. to find where difference comes in
Liability to get matt after two days.

Efron Chlorinated Rubber

#1 10 g Amber Crepe Para Rubber + 250 cc CCl_4
let stand over night swells up and only partly dissolves, then added 250 cc More CCl_4
put in jar with stirrer, tube reaching nearly the bottom to pass in chlorine and a vent going out into air
passed chlorine 3 hours found weight.
1500 g before 1545 after chlorination
kept cool by circulating water around jar while chlorinating, took out of water jacket let stand from 6 PM to 8.30 AM next morning
found all flocculent pieces then dissolved
formed a clear watery yellow liquid

Then put back in stirring machine and passed in air for 2 hours, when sample taken out and solvent evaporated became brittle on drying, also reacted to blue litmus paper

When poured out on a glass plate and let evaporate forms a fine clear film which is tough but somewhat brittle breaks easily and can be set by warming when hot then chill.

distilled some taking off 85% of solvent poured remainder on glass plate and let evaporate makes film but not thoroughly clear full of bubbles

Cut up film and tried following solvents:

Acetone	softens and whitens product	
Benzol	easily soluble	(Xylol good solvent)
Kerosene		
Solvent Naptha	easily soluble	
Amyl Acetate	easily soluble	
Turpentine		
Fusel Oil		
Gasolene		
Toluol	Soluble	Cont continued next page

Took some of original product precipitated out the rubber with Alcohol filtered washed with alcohol and dried comes out in a white solid and looks like fine cocoanut. this dissolves easily in Benzol and when evaporated makes a fine film with very few bubbles

P precipitated product pressed in a dye under heat becomes translucent of a light brown color ~~but very tough~~ very hard but brittle.

Made another batch same as # 1 except did not let stand over night after chlorination but passed in air until blue was not blued, passed in air rapidly found that gas became a strong acid and very much weaker on the acetate formally also on the oxalate product did not become thin but remained rather thick and more milky. This batch is extremely hard to filter as it is thick spread out on glass to a film it dries but remains very flexible.

Solvents continued

Glycerine

Oils

Castor
Olive
Camphor — Soluble slowly.
Rosin — Dissol turns white
Tar — Dissolves a little
Sassafras
Linseed
Straw

Soluble in Naphthalene when just melted.

Exp. Action of Fast Copper Plating Solution on Monel Metal

Temp =

On July 31 Monday 3.05 PM
Total Same

Small piece 1 3/8 X 1 5/8 X 1/32" completely covered
Weight before putting in Plating Sol = 18.2040 gr

Large piece 1 1/2 X 3" X 1/32 " sticking out of solution
Weight before putting in plating sol = 36.0853

Large Piece after 18 hours 9.00 a.m. Aug 1 35.8892
Small piece " " " " " " " 18.0845

	Time	Original Wt.	Wt.	loss	%
Large	18 hr	36.0853	35.5892	.1961	.51
Small	18 hr	18.2040	18.0845	.1195	.65

Monday Aug. 7 9.05 AM 162 hours

		Original Wt	Wt.	loss	%
Large	162	36.0853	34.8903	1.195	3.3%
Small	"	18.2040	17.5613	.6427	3.6%

Dissolved % between 18 - 162 hrs 2.79%
= 144 hrs = .019 % per hour.

Friday Aug 12 5 PM Total 266 Hours.

		Original Wt.	Wt	Loss	%
Large.	266 Hrs	36.0853	34.3266	1.7587	4.8%
Small.		18.2040	17.2746	.9294	5.1%

Dissolved between 162 and 266 hrs 1.5% = 104 hrs = .014 % per hour

Friday Aug. 18/22

Large	403 hrs.	36.0853	33.2200	2.8653	7.9
Small	"	18.2040	16.8970	1.3070	7.0%

Dissolved between 266 and 403 hrs - 3.1% : 137 hrs = .022% per hour

Aug. 25th

Large	571 hrs	36.0853	32.6900	3.3953	9.4%
Small	" "	18.2040	16.7280	1.4760	8.1%

Dissolved bet. 403-571 = 168 hrs = 1.5% = .009% per hour.

Sept 1st.

Large	739 hrs	36.0853	32.3030	3.7823	10.48
Small	739 hrs.	18.2040	16.6650	1.5390	8.45

Sept. 8th

Large	907 hrs	36.0853	32.2650	3.8203	10.59
Small	907 hrs	18.2040	16.6500	1.5540	8.54

Sept. 15th

Large	1075 lbs	~~36.0853~~	32.4228		
Small	1075 lbs	~~18.2040~~	16.7136		

Both pieces covered with green and brown deposits caused by the fact that Mr Edison introduced another piece of metal.

Mr Edison says clean off with brush as good as possible weigh and put in fresh solution leaving out the extra piece which he put in

Sept. 23 11.00 a.m.

Large	1206 lbs	36.0853	31.4280	4.6573	12.9%
Small	" "	18.2040	16.3045		10.4%

Sept 30 11 a.m.

Large	1434 lbs		30.8160		14.6%
Small	" "		16.1416		11.3%

Oct. 21 3 PM

Large	1938 lbs		28.8610	7.2243	20.0%
Small			15.5870	2.6170	14.3%

Dec 1 3.PM.

2922 lbs	Large		28.2577	7.8276	21.6%
	Small		15.4645	2.7395	15.4%

Nickel Hydroxide

262.85 — 80

104.8 — 32 × 20% excess = 38.4 g.

Soda is 96% so 04 × 38.4

the amount should then be.

104.8 g Nickel Sulphate $6H_2O$ require 39.9 g NaOH.

#1 First Lot Weighed out ingredients placed both in mortar added a few drops of water to start reaction and mixed got very hot and very pasty nearly dry.

Second Lot same as #1 except added 40 cc Water at once and then mixed in mortar very much like consistency of butter at about 80° F.

Made a Duplicate of Lot # 2.

3rd Lot. Same proportion as Lot # 2 except used made big batch and used the ratio of 30 water instead of 40.

1310 grams Ni Sulfate thru 20 mesh + 400 grams Dry Powdered NaOH mixed dry in a dish, then put on rolls in spatula-fuls while a stream of Water was being over rolls. used 375 cc Water.
all gone thru rolls 1/2 of water used up put thru again when all water was used up. then put thru 3 more times - totally 5 times in all. Spread out on wood pan to 1/4 - 1/2" thickness let dry 1/2 hr in above hot plate.

1 Week = 168 hrs.

Aug. 17/22

Normal Metal in Reg Ni Sulphate Solution
same as in the Reg Cu SO4 sol
On 5.00 PM.
Small fuse Original Wt. 13.2614 g
Large Fuse " " 26.6391
Sol brought over to Elem Room by Mr. Edison

Aug 25th.

Large	192 hrs	26.6391	26.6020	.0371	.14%
Small	" "	13.2614	13.2480	.0134	.10%

Sept. 1

Large	360 hrs		26.5900	.0491	.18%
Small	" "		13.2460	.0154	.12%

Sept 8th

Large	528 hrs		26.5810	.0581	.22%
Small	" "		13.2450	.0164	.12%

Sept. 15th

Large	696 hrs		26.5784		.22%
Small	" "		13.2400		.16%

Sept 23 11 a.m.

Large	887 hrs.		26.5346		
Small	" "		13.2277		

Sept 30 11 a.m

Large	1055 hrs		26.5105	.1286	0.48%
Small	" "		13.2227	.0387	0.29%

Oct. 21 3.00 PM

Large	1559		26.4510	.1881	0.7%
Small			13.2170	.0444	0.33%

2543 hrs

Large			26.3720	.2671	1.00%
Small			13.2046	.0568	0.42%

β Naphthalamine β sulphonic Acid made according to Jahres Berichte 29 1883

20 Kg. β naphthylamine werden in feines pulver in 60 Kg 96-97% Schwefelsäure langsam eingetragen unter umrührung dann erhitzt für 6 stunden auf 105°C dann in 250 Liter Kalte wasser hineingegossen und 24 stunden stehen lassen abfiltriert und ausgewaschen und getrocknet.

Test of Chalk.

	1st Sample	Prop.
$CaCO_3$	98.04	98.00
CaO	0.11	0.09
Moisture	0.32	0.20
$Fe_2O_3 Al_2O_3$	0.86	0.36
Silica	0.58	0.46
	99.91	99.11

Test on M Edisons Bench

$CaCO_3$ CO_2 to $CaCO_3$	98.61
Moisture	.14
Silica	.73
Fe_2O_3	.53
	100,01

Found about .1% Sugar.

Report on two samples of Vaseline

	Grade A	Petrolatum
Iodine Value	3.29	4.2
Saponification Value	None	None
Sulphur compounds	None	None
Flow Point	31.5	55
Free acid	None	None
Viscosity compared with Water at 100°C $\frac{\text{oil sec}}{\text{Water sec}}$	2.2	2.2

Petrolatum is a little stiffer at 32°F than the Grade A Vaseline.

Distillation Temp. in Degrees C.

	Sp.G. 60°F 45°Be Mecca	45°Be Mitchell	58°Be Tydol
1st drop	75.0	85	60
10	81.0	88	90
20	85.0	98	100
30	86.2	104	120
40	90.0	112	130
50	96.0	125	140
60	103.2	142	148
70	120.0	158	160
80	146.0	172	165
90	173.0	192	168
95	197.0	200	182

Low volatization quantities in each the same Tydol vaporizes when 95% has distilled over 18°C lower than Mitchell and 15°C lower than Mecca.

Sulphuric acid test Tydol Sulphuric acid layer a light brown Mecca a dark brown slightly muddy color Mitchell nearly black muddy color.

CS_2 Mecca .030%
Mitchell .036%
Tydol .030%

Report on 3 samples Gas Engine Oil

	Fisk	Franklin	Shepard
Flash Point	413°F	428°F	440°F
cc $\frac{1}{10}$ N Sulfuric to make acid	.2 cc	.3 cc	.2 cc
cc N NaOH for Saponifier	.7	.1	.1
Carbon Residue	.35	.30	.35
Vis @ 20°C comp water at 20°C $\frac{cc}{40 sec}$ Old Pipette	15.37	17.77	12.37
Vis @ 100°C comp water @ 20°C $\frac{sec}{40 sec}$ Old Pipette	2.17	2.5	2.17

Test for Volatile Matter in Powder from Powder Blank

Powder from A Mill Hopper at 12.30 Noon Oct 10/22 Is ready to be moulded

5.0000 Wt.
4.8762 Wt after 1 hour @ 212°F.
.1238 loss = 2.48 % Moisture
= 11.0g per Blank

4.8762 Wt after 1 hour at 212
4.7990 " after 1/2 hour at 320°F
.0772 = 1.5 % loss volatile matter.
= 6.75g per blank.

#2 Ungrounded Powder from #6 dryer at 2.30 PM Oct 10/22.

5.0000
4.7223 Wt after 1 hour @ 212
5)27.77 (5.5 %
25
27

4.7223 Wt after 1 hour at 212
4.7069
5)01.54 (.3
15

Check on another using a fresh lot from sample
5.0000
4.7528
5)2472 (4.9
20
47
45
22

Page 179 1 2 1

#1

Powder from Grinder @ 2.30PM Oct 10/22

5.0000
4.9319
5).0681 (1.3 %
5
18
15

4.9319
4.9125
5).0194 (0.38 %
15
44

After hours 320

#4

32.9246
25.8842
7.0404

33.2402
32.9246
.3156 = 4.4%

after 8 hours.

#1 after 24 hrs.

33.1010
32.7222
.3788 = 5.3%

33.0850
32.7222
.3628
= 5.1%
30 hrs

Dried 2 hours @ 212°F weighed then exposed to air Start 11.00 AM Oct 12

Wt. #1 Total = 32.7222
Dish = 25.6500
Wt of dry Wood Flour = 7.0722

32.7894
32.7222
.0672

33.4625
25.6500
7.8125g

33.4625
32.7411
.7214
= 9.2% Moisture in Original Flour

Gain in 1½ hour = to 0.95%

Wt #3 Total = 32.4934
Dish = 25.9629
wt dry Wood Flour = 6.5305

32.6118
32.4934
.1184

Gain in 1 hour = 1.8%

Wt #5 Total = 29.4074
Dish = 22.0074
Wt of dry wood flour = 7.4000

29.6667
29.4074
.2593
Gain in 4 hours 3.3%

Weighed dishes filled with wood flour put in oven at 212 for 2 hours then cooled in dessicator weighed then put out in open room to collect moisture.

" Only #1 was also weighed before dry to get the original moisture in the Wood Flour as sent to Lab.

Relative Humidity Wet 60 Dry 72 = 49% at Noon.

At Noon Oct 13 56 – 66 = 53%

Page one

Fr Wet for Gum Sp.G. .840 alcohol
= 87.8%

Sample. New alcohol used in Powder Blanks
Oct. 11/1922
Sp. G @ 15°C. = .814 = 95.5% by Volume
Total 59.7880
Wt. Dish = 59.7844
.0036 Residue from 100cc

100cc requires 5cc $\frac{1}{10}$ NHCl = .0036 X 5
.0180 = 1.8%

Sample Recovered Alcohol
Sp G @ 15°C = .914 = 60.9% by Volume
Total 32.1656
Wt. 32.1202
.0454 Residue from 50cc
2
.0908 " " 100cc

Call it 0.1%

5.00 PM 13th

	Wet	Dry	Dif	
5 PM Humidity	57	66	9	= 58%
9 AM 14th	56	64	8	= 61%

46 hrs.

33.1500
32.7222

7.6722) .4278.000 (6.4
4243 32
34680

~~Sat Oct. 21st.~~

~~One of the cells from Mr Hanby~~

Sample of Bengal Red Oct. 16-22

cc	Temp °C	
1st drop	79.2	95% Methyl B.4
10	79.7	[illegible]
20	79.8	
30	79.9	Sulphuric Acid [illegible] OK.
40	80.0	
50	80.0	Coffee [illegible] K.
60	80.2	
70	80.4	
80	80.4	
90	81.0	
95	81.6	

Nov. 17th 24

Batch #1

Experiment Making Phenol Resin

105 grams. 90.05 % Phenol from Silver Lake

66 grams: 40.45 Formaldehyde from Lubrico

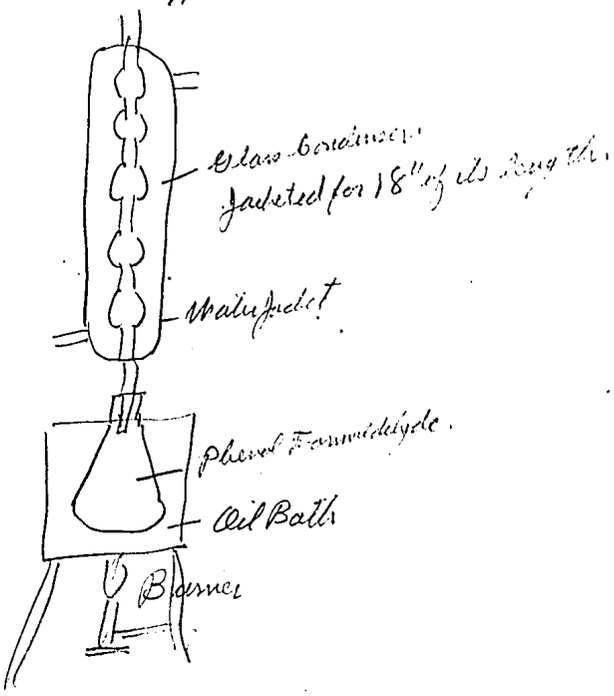
Start. 10.00

Deg F	Time	Nov. 17th
Start	10.00 AM	
248	10.30	
260	10.40	
270	10.50	
280	11.00	
310	11.40	
312	12.00	10 1/2 hrs
318	1.25	
328	2.00	
330	3.35	
330	5.00	
330	9.00	

at. 310 condensation not quite to 3rd ball.
Put on again after the Edison formed a little unit.

On		Fah Degrees.
	10.10	
	10.45	300
	11.40	350
	1.45	330
	5.00	332

Apparatus



Batch #2

Same proportions as batch #1 except put on hot plate temp. 250°F.
on. 10.45 AM Nov. 18th Tuesday.

Flask	147	Left 115 = 239
Phenol	105	
	252	
Formaldehyde	60	
Total wt.	312	

Steam off Sunday all day.

#3

Flask =	142.5	Water 19 hrs.	342.5
Phenol =	105	loss =	10 g.
	247.5		
Formaldehyde	105.		
	352.5		

Phenol 99.05% from Silver Lake, Formaldehyde 40.4% from Lake View Chemical Co.

Time	Temp.		Thursday	
		920		
815	—	940	240	
915	260	1000	290	
945	300	1030	302	
10.30	312	1200	354	
10.45	324	200	336	8 hrs
11.15	340	400	328	
12.00	320	500	320	
1.30	334	11 3/4 540	324	
2.30	340			
4.30	320			
5.45	340	Total 19 3/4 hours.		
9.00	308			
Wednesday.				

2 pages over.

#4

Flask 134.5
Phenol 105.0
239.5
Formaldehyde 72
311.5

Wt after 19¼ hrs = 309.5
loss = 2 grams

Cent°	F°	Time
—		9.00
74		915
100		930
120	248	945
130	266	1015
136		1045
140	284	1100
147		11.15
155	311	1200
152		130
156		300
156		430
156		545
156		9.00
160	320	

Wednesday.

11¼ hrs.

Thursday

Cent°	F°	Time
		920
110		9.40
146		10.00
150	302	10.30
157		12.00
160	320	2.00
164	327	4.00
164	327	5.40

#3 continued Phenol Boils at 182.6° Cent

Was then distilled using a condenser to catch the distilled material

Temp. Cent°	cc distilled over	
40	— Smell some Formaldehyde	
97	1st drop.	
97	5	102
97	10	142
97	20	244
98	30	
98	40	
98	50	
100	60	
100	70	
105	80	— Dropwise still smelled Formaldehyde
120	90	Phenol Resin becomes very viscous

at 120° Had to stop as Phenol Resin started up to the neck of the distilling flask. A peculiar fact is that during the entire distillation up to 80cc the two layers never mixed.

Original Weight Flask + Chemicals = 352.5
After Condensing 19¾ hrs 342.5
Loss 10.0

Total Wt. After distillation 250.0
Distilled off. 92.5
Grams in Flask — 102.0

This will not melt on hot plate gone too far

#4 Continued.

Temp Cent°	
96	1st drop
97	5
97	10
98	20
98	30 drops smell
98	40 Formaldehyde
98	50
98	60
112	65

Thermometer quickly rose to

177	
178	5 cc
180	10 cc
180	15 cc

Started to spit and foam also brown at bottom Stopped.

Total Weight		311.5
Wt. after Condensation	19¾ hrs.	309.5
Loss		2.0
Wt after distillation		227
Distilled off		82
of which 15 cc was bet 177-180° cent.		
Wt of Final Material		92.5